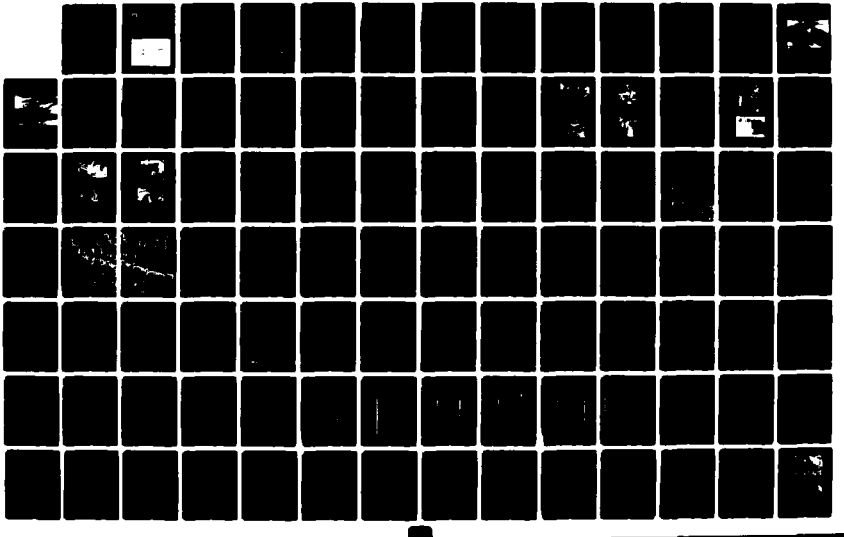
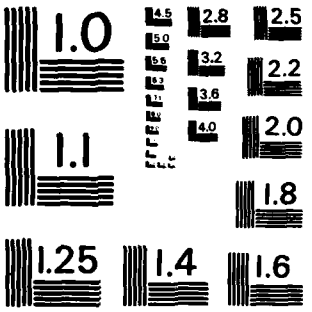
AD-A133 180 OUTLET WORKS JOE POOL LAKE MOUNTAIN CREEK TEXAS(U) ARMY 1/2
ENGINEER DISTRICT FORT WORTH TX A J MARR JUN 83

UNCLASSIFIED F/G 13/13 NL

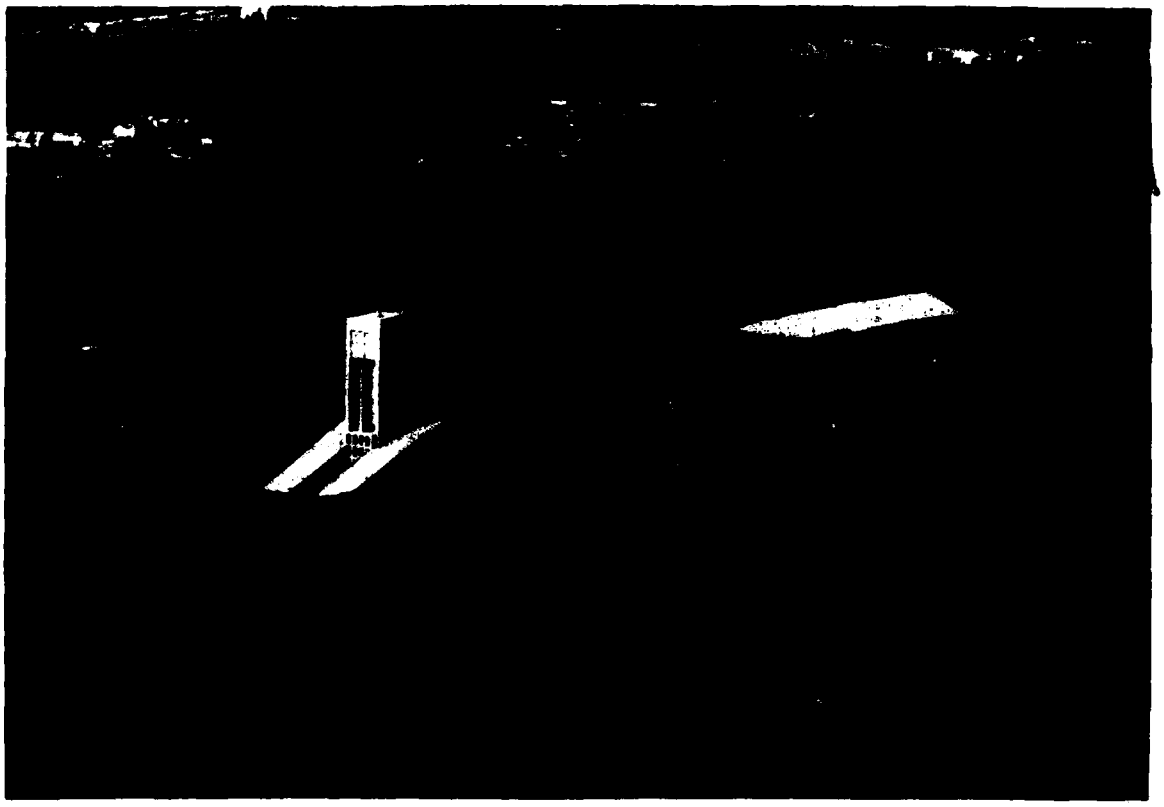




US Army Corps
of Engineers
Fort Worth District

FINAL FOUNDATION REPORT

OUTLET WORKS
JOE POOL LAKE
MOUNTAIN CREEK, TEXAS



JUNE 1983

CORPS OF ENGINEERS
FORT WORTH DISTRICT, TEXAS

FINAL
FOUNDATION REPORT

JOE POOL LAKE
OUTLET WORKS

BY

ALAN J. MARR
GEOLOGIST

JUNE 1983

PREFACE

This report was made by the Geotechnical Branch, Engineering Division, Fort Worth District. The report was prepared by Staff Geologist, Alan J. Marr, under the supervision of the Project Geologist, Robert C. Behm, the Chief of the Geology Section, Melvin G. Green, and the Chief of the Geotechnical Branch, Wayne E. McIntosh.

District Engineer for the Fort Worth District during construction of the Joe Pool Lake Outlet Works was Colonel Donald Palladino. Mr. Shigeru Fujiwara was Chief of the Engineering Division and Messrs. Gary Hames and Mel Sadler served as Resident Engineer during construction.

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

TABLE OF CONTENTS (cont'd)

PLATES

ILLUSTRATIONS

FINAL FOUNDATION PHOTOGRAPHS

TABLE OF CONTENTS (cont'd)

FINAL FOUNDATION PHOTOGRAPHS

TABLE OF CONTENTS (cont'd)

FINAL FOUNDATION PHOTOGRAPHS

I INTRODUCTION

1. Project Location and Description. The Joe Pool Dam and Lake[1] project is located in southwest Dallas County near Grand Prairie, Texas. The dam is located at river mile 11.2 on Mountain Creek, a tributary to the West Fork of the Trinity River. Location of the project is shown on plate 1. The principal features of the Joe Pool Dam and Lake project include: (1) A rolled earth-fill embankment approximately 22,180 feet long with a crest width of 30 feet; (2) a service spillway perched in the left embankment at station 100+00 having a concrete uncontrolled rectangular broadcrested weir 50 feet wide; and (3) a 10.5-foot diameter cut and cover conduit controlled by two 4.75 X 10.5-foot service gates.

2. Construction Authority. Congressional authority for the construction of Joe Pool Dam and Lake is contained in the Public Works - Rivers and Harbor Act approved 27 October 1965 (Public Law 89-298) in accordance with the overall plan of improvement of the Trinity River Basin, Texas as outlined in House Document No. 276 (89th Congress, 1st Session).

3. Purpose of Report. This report has been prepared in accordance with requirements as set forth by the Office, Chief of Engineers, and is the first of two such reports that will record the foundation history of each structural feature of Joe Pool Dam. The subject of this report is the outlet works, to include the approach channel, intake tower approach slab, intake tower, conduit, stilling basin, and discharge channel. A second report will address the embankment, spillway, and service bridge portions of the project.

The purpose of this report is to provide a complete record of foundation conditions encountered during construction. Information contained in this report will be valuable when evaluating (1) necessary remedial action required to prevent or repair any failures resulting from foundation deficiencies, (2) contractor claims related to foundation conditions or alleged change of condition, and (3) planning and design of future comparable construction projects.

A copy of this report should be included in the permanent records maintained at the project office.

4. Project History. Seven damsite locations along Mountain Creek were studied before the proposed site was selected. Subsurface investigations at the proposed site were initiated in April 1969, and continued intermittently over a 10-year period.

The spillway and outlet works were originally sited on the right abutment and were extensively investigated by subsurface exploration.

[1] In December 1987 Public Law 97-400 was passed by Congress which officially changed the name of the Project from Lakeview Lake to Joe Pool Lake. All previously published documents, design memorandums, plans, and specifications are entitled Lakeview Lake and will be referred to under the name Lakeview Lake in this report.

These investigations revealed the presence of unsuitable geologic bedrock conditions in the right abutment. As a result the two structures were resited on the left abutment.

5. Location of the Outlet Works. The outlet works is located on the left abutment at embankment station 76+00. The site plan is shown on plate 2. Aerial views of the site are shown on figures 1 and 2.

6. The Contract. The contractor and pertinent information related to the contract are listed below:

Joe Pool Dam - Outlet Works and Initial Embankment

Contractor:	The Lane Construction Corp., Meridian, CT
Contract No.:	DACW63-80-C-0009
Bid:	$11,200,632.50
Contract Awarded:	19 November 1979
Notice to Proceed:	30 November 1979
Acknowledged:	6 December 1979
Work Commenced:	7 December 1979
Work Completed:	4 June 1982

NOTE: Construction items included in this contract were the outlet works and two partial embankments. Only the outlet works is discussed in this report. The two partial embankment foundations will be discussed in the Joe Pool Embankment and Spillway Foundation Report.

7. Quality Control. The quality control organization was furnished and compensated by the contractor.

8. Contract Supervision. The outlet works was constructed under the immediate supervision of the District Engineer, U.S. Army Engineer District, Fort Worth, Texas. The contracting officer's representative for administration of the contract was Mr. James D. Leslie, Area Engineer, North Texas Area Office. Messrs. Gary Hames and Mel Sadler each served as Resident Engineers during construction.

Fig 1 Aerial view of Joe Pool Outlet Works excavation

Fig 2 Aerial view of Joe Pool Outlet Works excavation

II FOUNDATION EXPLORATIONS

1. Investigations Prior to Construction. The outlet works was originally sited in the right abutment of the dam. Subsurface investigations in this area, which consisted of 22 core borings, revealed the presence of unsuitable foundation conditions. As a result the outlet works was resited at embankment station 76+00 on the gently sloping left abutment.

Investigations for the left abutment site (the actual construction site) consisted of 33 borings ranging in depth from 25 feet to 125 feet. Locations of the borings are shown on plate 4 and logs of the borings are presented on plates 12 through 25.

2. Investigations During Construction. No unanticipated foundation conditions or problems were encountered during construction. Therefore, no investigations were required during construction.

III GEOLOGY

1. Physiography and Regional Geology. The Joe Pool Dam site is located at the eastern edge of the Eagle Ford Prairie section of the Gulf Coastal Plain physiographic province. Topographically, the damsite is characterized by a moderately steep east abutment, a flat 5000 feet wide floodplain, and a gently sloping west abutment.

The major topographic feature in the area is the White Rock escarpment located one-half mile east of the dam's right abutment. This escarpment trends north-northeast and marks the eastern edge of the Mountain Creek drainage area. Immediately west of the White Rock escarpment are numerous remnants of a small cuesta. The cuesta was formed by a resistant limestone bed of the Eagle Ford Formation which was later eroded into a series of sub-rounded hills rising 30-60 feet above the present Mountain Creek valley. The dam's moderately steep east abutment is formed by one of these hills.

Bedrock strata underlying the embankment and reservoir area consist of Upper Cretaceous units of the Eagle Ford Formation. Regional dip of the Eagle Ford strata is gentle and to the southeast toward the Gulf of Mexico. At the damsite the maximum thickness of the Eagle Ford Formation is 225 feet as indicated by borings along the dam axis which penetrated the Eagle Ford and bottomed in the underlying Woodbine Formation. Lithologically the Eagle Ford Formation consists predominantly of soft to moderately hard clay shale. An areal geology map is shown on plate 3.

2. Geology of the Outlet Works.

a. Description of the Overburden. Overburden within the limits of the outlet works excavation consisted of recent floodplain deposits and older Quaternary terrace deposits. The deposits consisted of sandy clay, clayey sand, and gravel. Overburden slopes in the portion of the outlet works excavation which occurs beneath the embankment were mapped in detail and are presented on plate 6. A typical section of overburden in the outlet works area consisted of an upper zone of dark brown, stiff, silty clay with occasional rootlets near the surface, and occasional calcareous pocket with scattered calcareous nodules to 3/4-inch diameter. Downward the clay becomes more calcareous, sandy to very sandy, stiff to very stiff, and tan to brown with occasional gravels. Sand and/or gravel is usually found at the base of the overburden, and immediately overlying the weathered primary. The composition of this zone varies from almost a pure, non-cemented, orange sand in the excavation slope left of the stilling basin, to a mixture of sand and gravel, to a moderately clean, angular, tan gravel located in the right slope of the excavation near the intake tower. A soft, mushy area was observed in the left (west) slope of the excavation at station 23+00 where the sand gravel zone produced a small amount of seepage.

b. Bedrock Stratigraphy. The outlet works was founded within the Britton member of the Eagle Ford Formation, upper Cretaceous in age. The Britton member is the lowest member of the Eagle Ford Formation and is approximately 160 feet thick at the outlet works site. Based on lithology the Britton member is divided into three units. In ascending order they are: (1) The Lower Britton, Unit I; (2) the Lower Britton, Unit II; and (3) the Upper Britton. The Lower Britton, Unit II, and the Upper Britton comprise the outlet works foundtion. The contact between the two members was exposed in the stilling basin chute at station 27+57.6, elevation 447.84. Thus the lower chute section and the stilling basin were founded in the Lower Britton, Unit II member. The remainder of the structure was founded in the Upper Britton member of the Eagle Ford Formation.

c. Bedrock Lithology. The Lower Britton, Unit II, in the chute and stilling basin area is 15 feet thick and consists of moderately hard to hard, occasionally jointed, tannish-gray very calcareous clay shale. The Upper Britton, which supports the remainder of the structure, consists of soft to moderately hard, slightly calcareous, highly jointed and fractured bentonitic clay shale. The following chart details the distinguishing characteristics between the Lower Britton, Unit II, and the Upper Britton in the area near the contact:

Upper Britton	Lower Britton, Unit II
Soft to moderately hard	Moderately hard to hard
Thin-bedded - ripply surface	Thick-bedded
Highly jointed and fractured	Occasional joints and fractures
Dark Gray	Tannish-gray
Scattered fossil shells	Fossiliferous (fine fish scale remains)
Occasional limestone or claystone concretion layers	

d. Bedrock Structure. Regional dip of the strata of the Eagle Ford Formation is to the east-southeast at approximately 50 feet per mile. However, local dip of the strata beneath the outlet works structure showed some variation, ranging from 100 feet per mile to the south to 200 feet per mile to the north, striking generally along an east-west line. Changes in dip often occurred at points where fault planes intersected the outlet works. A total of seven minor faults or fault zones were encountered beneath the structure at the following stations:

20+00	Intake tower
21+02	Conduit
22+19	Conduit
23+76	Conduit
25+60	Conduit
26+67	Conduit
28+78	Stilling basin endsill

There was no distinct pattern as to the orientation of the strike of the faults exposed in the excavation. All of the faults were normal faults. Dip of the fault planes was to the south and displacement across each fault was minor (less than 1.0 foot) in the outlet works structure foundation. However, as much as 2 feet of displacement was observed higher in the section in the IV on 3H clay shale slopes of the outlet works excavation. The fault planes were generally tight with brecciated zones less than 6 inches thick. Minor jointing and fractured zones also occurred in the outlet works foundation. The location of all faults, joints, and fracture areas exposed in the bedrock excavation in the immediate area of the structure are shown on plate 6.

e. Bedrock Weathering. Final excavation grade for the outlet works structure occurred well below the base of bedrock weathering. All foundation bedrock on which concrete was placed was unweathered. Bedrock weathering observed in the slopes of the excavation on each side of the structure can generally be classified into two zones. The upper zone of weathering is described as highly weathered. This zone consists of soft, highly plastic, brown shaly clay. The lower zone is described as slightly weathered and consists of soft, highly jointed-fractured, gray to dark gray clay shale with iron staining on the joint and bedding plane surfaces. This zone grades downward into unweathered clay shale. The combined thickness of the weathered zones in the outlet works area varied from 2.0 to 13.7 feet.

f. Ground Water. No significant flow of ground water was encountered in the outlet works excavation. A very small amount of ground water seeped from the overburden in the left side of the excavation at station 23+00 creating a soft, mushy area on the slope. The areal extent of this seep is shown on plate 6. Excluding this one area, the remainder of the excavation slopes were free of ground water. Faults and joints in the foundation bedrock were tight and produced no ground water.

3. Engineering Characteristics of the Overburden Materials. Overburden in the vicinity of the outlet works consisted primarily of sandy clays (CL and CH) with discontinuous beds of clayey sands and gravel (SC and GC).

Classification and index testing were performed on samples of the various materials comprising the overburden. Results of the tests are presented in Section VIII of the Lakeview Lake Design Memorandum No. 24, Outlet Works. The following shows the range of values and the average values obtained from the tests:

Soil Type		Moisture Content %	Liquid Limit-Plastic Limit	Bar Linear Shrinkage %
CH	Range	9-21		22-24
	Avg	16	60-17	23
CL	Range	6-19		15-20
	Avg	13	42-12	18
SC	Range	6-16		
	Avg	9	37-11	14
GC	Range	6-23		
	Avg	12	-	-
SM/SC	Range	4-7		
	Avg	6	-	-

For design purposes the following strength properties were assigned to overburden materials in the outlet works vicinity:

Type Material	Type Strength	c tsf	Ø degrees
CL&CH	Q	1.0	1.0
CL&CH	R	0.3	13.0
CL&CH	S	0	20.0
SC&GC	Q	-	-
SC&GC	R	-	-
SC&GC	S	0	30

4. Engineering Characteristics of the Primary Materials. Primary materials in the outlet works foundation on which laboratory testing was performed include, in descending order, weathered Upper Britton clay shale, unweathered Upper Britton clay shale, unweathered Lower Britton, Unit II clay shale, and bentonitic clay shale zones in the Lower Britton, Unit II. Results of the tests are presented in Section VIII of the Lakeview Lake Design Memorandum No. 24, Outlet Works. The following shows a range of values and the average values obtained from the tests:

Rock Type		Moisture Content %	Natural Dry Density lb/cu ft	Unconfined Compressive Strength ton/sq ft	Bar Linear Shrinkage %
Upper Britton (wea. clay shale)	Range	21.3-34.7	87-110		18-26
	Avg	27.8	96	5.8	21.8
Upper Britton (unwea. clay shale)	Range	16.3-27.0	104-120	1.9-18.2	13-24
	Avg	19.4	114	12.0	17.3
Lower Britton (Unit II) (unwea. clay shale)	Range	14.3-19.0	103-120	7.2-64.2	13-18
	Avg	17	112	32	15.5
Lower Britton (Unit II) (bentonite	Range	40.0-42.8	86-107	-	30-32
	Avg	41.4	99		31

For design purposes the following properties were used for the primary materials:

Type Material	Type Strength	c tsf	∅ degrees
Shale	S	0.5	18
Bentonite	S	0	18

IV EXCAVATION PROCEDURES

1. Excavation Grades. Actual foundation conditions encountered during excavation for the Joe Pool Outlet Works structure were essentially as described in the subsurface data presented in the contract plans and specifications. The designed slopes in the overburden and primary materials were achieved and maintained without difficulty. Some minor variations (overexcavation) from the designed grade lines occurred in the primary material. Final cross sections on the overburden slopes were taken by the Contractor's survey team and checked by a government survey team. The contractor's survey team made all measurements of final excavation grade in the primary material and also assisted the CE geologist in mapping the foundation. Final excavation grades for the approach channel, the outlet works structure, and the discharge channel are shown on plates 5 through 7. Geologic sections are presented on plates 9 through 11.

2. Dewatering Provisions. No serious ground water problems were encountered in the outlet works excavation. With the exception of one small seepage area on the left slope of the excavation at station 23+00, the overburden and primary materials bordering the outlet works excavation were essentially free of ground water. Surface runoff was controlled in three stages. First, a series of diversion ditches located around the periphery of the excavation carried surface runoff away from the excavation. A 10-foot wide berm located about midway up the slopes of the excavation intercepted surface water on the slopes and helped to control erosion. Surface runoff that collected in the stilling basin excavation was removed by 3-inch electrical pumps. These dewatering provisions were effective in maintaining a dry excavation. All concrete and impervious backfill placements were on foundations free of water.

3. Overburden Excavation. Overburden materials in the outlet works excavation included sandy clays, clayey sands and gravels in varying mixtures as previously described. Stripping for the outlet works excavation began on 30 May 1980. Overburden materials were removed using Caterpillar scrapers pushed by Caterpillar D-6 and D-8 bulldozers. The IV on 5H overburden slopes were shaved and finished using motor graders. Suitable overburden materials removed during the outlet works excavation were used as random and semi-compacted fill in the partial embankments being constructed concurrent with the outlet works.

4. Rock Excavation. Primary material removed from the outlet works excavation included weathered and unweathered clay shale of the Eagle Ford Formation. Methods used to excavate the primary material varied according to the material being excavated and the required accuracy of the excavation grade. The following methods were employed:

a. Bulk excavation of weathered clay shale was accomplished similarly to the excavation of overburden materials. This soft, clay-like material was

removed using Caterpillar scrapers pushed by Caterpillar D-6 bulldozers. Slopes in the weathered clay shale were finished to 1V on 5H using motor graders. Most of this material was suitable for use as semi-compacted fill in the partial embankments.

b. Bulk excavation of the soft to moderately hard, unweathered clay shale was accomplished using Caterpillar D-8 bulldozers equipped with ripper teeth. The broken material was then removed using Caterpillar scrapers pushed by D-6 and D-8 bulldozers, and transported to a designated waste disposal area east of the outlet works site. Slopes in the unweathered clay shale were cut and shaved to 1V on 3H using bulldozers and motor graders. This bulk excavation method was used to excavate down to within a minimum of 2 feet above the designed excavation limit in the areas of the excavation which would later be covered with protective concrete or impervious backfill. Final grade in the approach and discharge channels was achieved using this method of excavation.

c. A minimum of 2 feet of undisturbed clay shale was left on all rock foundation surfaces for subsequent removal immediately prior to backfill. Excavation of the remaining 2+ feet of unweathered clay shale in the areas adjacent to the structure limits subsequent to the placement of impervious backfill was accomplished using Caterpillar scrapers pushed by D-6 bulldozers. A Case 350B bulldozer was used to push loose material down the 1V on 3H slopes to be picked up with scrapers and a front-end loader. Final cleaning immediately prior to placement of impervious clay was accomplished with compressed air, and occasional hand-broom cleaning, if required.

Excavation of the final 2+ feet of clay shale cover in the areas beneath the outlet works structure prior to the placement of protective concrete was accomplished with a Warner-Swasey Model G 660 Gradall supported by a Caterpillar front-end loader and a dump truck. Two interchangeable buckets were utilized with the Gradall. A bucket equipped with 6-inch teeth was used to excavate to grade. For final cutting and smoothing the operator switched to a bucket equipped with a blade. In the V-shaped conduit excavation the contractor used three V-shaped wooden template forms to monitor the slopes and elevations of the ditch during excavation. The templates, shown on figure 4, greatly increased the efficiency of the Gradall operations, thereby decreasing the amount of time elapsed between initial cut to final grade and backfill with protective concrete.

The efficiency of the excavations performed by the Gradall machine was highly dependent upon the skill level of the operator. Rapid excavation was required in order to meet the 2-hour maximum time limit between reaching final excavation grade and placing protective concrete. Gradall excavations required constant monitoring to insure final grade was achieved and to minimize overexcavation. In the conduit foundation considerable difficulty was encountered in excavating a V-shaped ditch through moderately hard, horizontally-bedded clay shale. Some over-excavation resulted even with a skilled Gradall operator and nearly constant monitoring.

Fig 3 Conduit foundation with protective concrete in place

Fig 4 Wooden templates used to monitor conduit excavation

Fig 5 Typical collar excavation

Fig 6 Typical preparation for structural concrete placement in collar excavation

5. Overexcavation. Overexcavation occurred in the following areas:

a. Intake structure/conduit transition area. Preliminary excavation was designed to remove the bulk of the material down to, and not below a minimum of 2 feet above final excavation grade in order to leave 2 feet of undisturbed clay shale as protective cover. However, in the transition area the contractor, as a result of contractor's surveying error, carried preliminary excavation down below final design grade. Several days later, when the contractor was ready to place protective concrete, he was directed to excavate even further below the designed grade so that protective concrete would be placed on fresh, undisturbed clay shale as required by the specifications. As a result the final grade of the transition protective slab is a maximum of 1.6 feet below the designed grade.

b. Along the conduit foundation at locations where the contractor attempted to cut a V-shaped ditch in a soft to moderately hard, horizontally-bedded clay shale. Excavation for the conduit foundation was accomplished using the Gradall, and elevations were monitored using hand levels and wooden templates constructed in the design shape of the ditch. The nearly horizontal caly shale beds, generally less than 1-ft thick, were often separated by slightly softer, bentonitic clay shale seams. This condition made it difficult to attain a smooth, symmetric V-shaped ditch.

c. At select areas in the foundation rock where faulting, jointing, and fracturing were present. These areas are shown on the as-built Excavation Map, Plate 6, and the Structure Foundation Map, Plate 8. During excavation the contractor was required to remove all loose and broken rock material normally associated with faulted and jointed zones, so that protective concrete or impervious backfill would be placed on fresh, competent clay shale. A record of the estimated amount of overexcavation and subsequent concrete overrun in the faulted and jointed areeas was maintained by the government inspector.

6. Foundation Preparation. The outlet works foundation consists of unweathered clay shale belonging to the Upper Britton and the Lower Britton, Unit II, members of the Eagle Ford Formation. Preliminary test results indicated the need to minimize the exposure time of the clay shale in order to retard change in moisture content and subsequent deterioration. Figure 7 shows the severity of the deterioration of the foundation clay shale after it remains exposed to air for a period of 3 to 4 weeks. Therefore, a minimum of 2 feet of undisturbed clay shale protective cover was left on all rock foundation surfaces (with the exception of the area described in para 5a) for subsequent removal immediately prior to backfill with protective concrete or impervious clay.

a. Foundations Beneath the Structure. Each day a specific area was designated as the worksite and the final 2+ feet of clay shale protective cover was removed using the Gradall G 660. Upon achieving final design grade, all loose, drummy, or otherwise unsatisfactory rock was removed and the surfaces were cleaned using compressed air. Figures 13 through 63

Fig 7 Typical clay shale deterioration after 3 to 4 weeks exposure

Fig 8 Application of Aerospray 52 moisture sealant

show the condition of each segment of the structure foundation after cleaning and prior to protective concrete backfill. While the surface was being cleaned, the contractor's survey team took final grade cross-sections and assisted the CE geologist in mapping geologic features in the foundation. Immediately after the cleaning and mapping were completed, and the foundation was approved by the inspecting geologist, a 1:1 mixture of water and Aerospray 52, a resin-type sealer manufactured by American Cynamid Company, Wayne, New Jersey, was mechanically sprayed onto the rock surface as shown in figure 8. The foundation surface was then covered with a minimum of 4-inches of protective concrete. A complete record of foundation approval is presented in Section IX of this report.

b. Foundations Adjacent to the Structure. Foundations adjacent to the structure include the unweathered clay shale surface from the edge of the protective concrete to the top of the unweathered clay shale on the excavation slope at approximate elevation 495. The final 2+ feet of clay shale in the foundation adjacent to the structure was excavated using Caterpillar D-6 and D-8 bulldozers equipped with ripper teeth and scrapers. Each day a specific area was designated as the work area and the final 2+ feet of protective clay shale was excavated. Upon achieving final design grade on the foundation floor and slopes, all loose material was removed and the surface was cleaned using compressed air. While the surface was being cleaned the contractor's survey team took final grade cross-sections and assisted the CE geologist in mapping geologic features in the foundation. After the surface was cleaned, mapped, and approved, the rock surface was wetted lightly, and then covered with at least 2 feet of impervious clay backfill before the day's work ended. Figures 64 through 97 show the condition of the foundation adjacent to the structure after cleaning and prior to backfill with impervious clay.

c. Overburden. Overburden materials exposed in the excavation slopes were mapped in detail and are shown on plate 6. Horizontal and vertical limits of the overburden are presented on the cross-sections, plates 9 through 11. No further excavation occurred in the overburden immediately prior to backfill. Materials in the exposed overburden slopes were processed in place and integrated into the impervious clay backfill. Materials were mixed, processed, and benched into the overburden slopes in horizontal layers, and then compacted.

7. Safety. There was no requirement for protection against slides and rock falls in the outlet works excavation. The 1V on 5H overburden slopes and the 1V on 3H primary slopes remained stable throughout construction.

V FOUNDATION ANCHORS

1. General. Permanent foundation anchors were installed in the Joe Pool Dam Outlet Works chute and stilling basin areas. A total of 70 foundation anchors were installed to a minimum depth of 21 feet below the surface of the protective concrete slab.

2. Equipment. The 6-in diameter holes for the foundation anchors were drilled using a Gardner-Denver track-mounted pneumatic drill, shown on figure 9. The anchors consisted of No. 11 rebar equipped with vertical bar spacers wire-fastened to the anchor at 4.75 ft intervals. A one-half inch steel grout pipe designed to extend from the surface to the bottom of the anchor was permanently fixed to each anchor. The grout mixture placed around the anchors consisted of 1.32 gallons of water per 55-pound bag of Masterflow 713 non-shrink grout. The grout was agitated in a one-fourth cu yd electric mortar mixer and pumped into the hole.

3. Procedures. Drilling and installation of the foundation anchors began on 23 March 1981 in the chute section. All of the anchors in the chute section were set at an angle 30° from vertical; anchors in the stilling basin section were set at vertical. Holes for setting the foundation anchors were drilled through the protective concrete slab into unweathered Eagle Ford shale to a total depth of 21 feet. Upon reaching the required depth the holes were blown clean using high velocity air, and tightly plugged until placement of anchor bars and grouting commenced. All holes remained free of water until grout was placed. The normal procedure was to drill a predetermined number of holes, insert the anchor bars, and place grout, all on the same day. After the anchors were set in the hole at the correct elevation, the grout mixture was pumped through the one-half inch grout pipe until grout returned to the surface indicating the hole was filled. As per the grout manufacturer's recommendation, the bars were not vibrated during placement.

4. Pull-Out Tests. Pull-out tests were performed on 19 March on two test anchors installed on 6 March 1981. One test was conducted on an anchor installed in the slope of the chute section at approximate station 27+40; another test was conducted on an anchor installed in the horizontal stilling basin floor at approximate station 27+77. Both anchors were stressed to 50 tons with no failure in the bar or the foundation. Figure No's 11 and 12 show one of the tests in progress. A complete record of test data is on file in the SWF Design Branch, Structural Section.

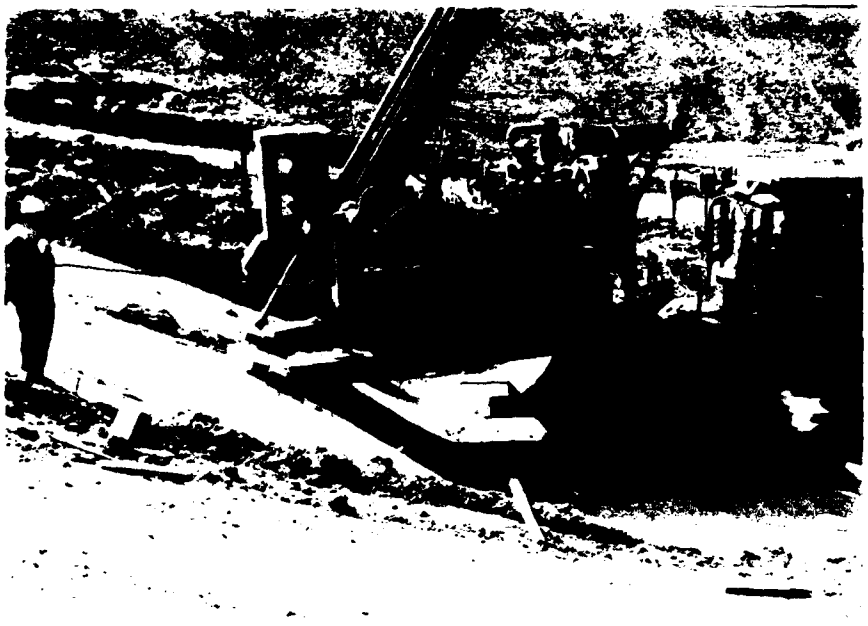


Fig 9 Drilling hole for rock anchor

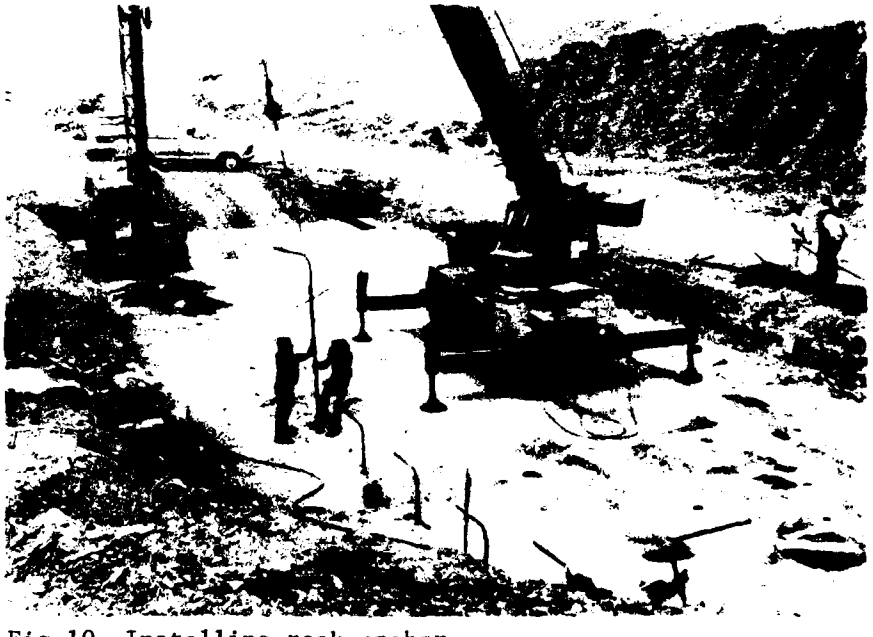


Fig 10 Installing rock anchor

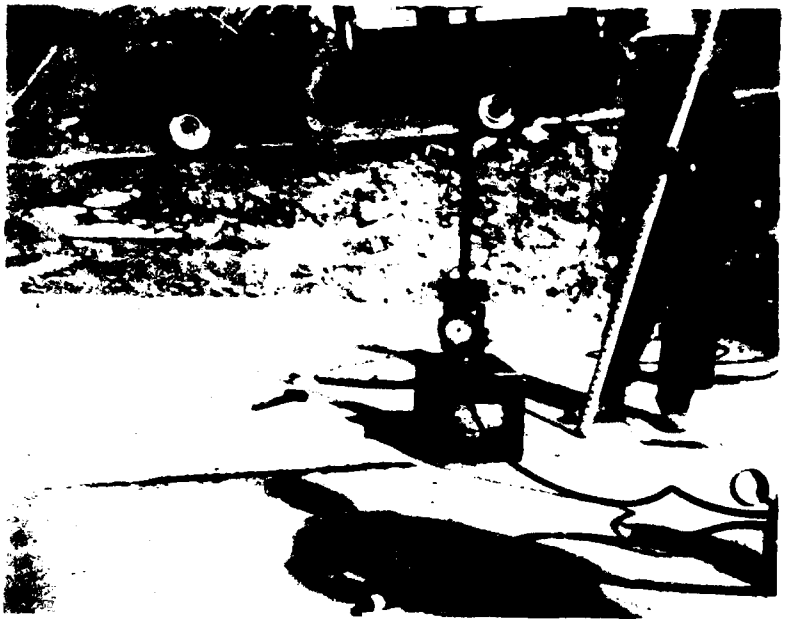


Fig 11 Conducting pull-out test

Fig 12 Conducting pull-out tests

VI CHARACTER OF THE FOUNDATION

1. General. Clay shale belonging to the Lower Britton Unit II and the Upper Britton Members of the Eagle Ford Formation, Cretaceous age, comprise the rock foundations beneath the outlet works structure, adjacent to the structure, and on the slopes of the outlet works excavation up to approximate elevation 500. Overburden consisting of mixtures of clay, sand, and gravel constitute the slopes above elevation 500. A geologic map of the outlet works excavation is presented on plates 5 through 7. Engineering characteristics of the overburden and primary materials comprising the outlet works foundation were presented in Section III of this report. Included is a range of values and the average values of engineering characteristics as derived from pre-construction testing of material samples.

2. Upper Britton Member of the Eagle Ford Formation. The Joe Pool Dam Outlet Works approach slab, intake tower, conduit, and upper portion of the chute section were founded on unweathered clay shale belonging to the Upper Britton Member of the Eagle Ford Formation. The clay shale is soft to moderately hard, gray, medium to thin-bedded, and contains occasional pockets of fossil shells (Inoceramus Hibiatus). Thin, soft to moderately hard bentonitic shale seams occur throughout the exposed section. Minor faulting and associated jointing and fracturing noted is shown on plate 6. All encountered faults were normal faults, usually of high angle and low displacement, with less than 1 foot-thick brecciated zones adjacent to fault planes. Joints were tight and tended to dissipate vertically. Within 1 hour after exposure to air and/or sunlight, the clay shale began to show signs of deterioration as predicted by pre-construction test results. Initially the color of the clay shale changed from dark gray to light gray as a result of moisture loss. After a few hours, hair-line cracks appeared along with some minor slaking. After a few days the outer 1 inch of the rock surface would be cracked and deteriorated and could be peeled from the surface by hand. Figure 7 shows the condition of the clay shale after it is left exposed for a period of 3-4 weeks.

3. Lower Britton Unit II Member of the Eagle Ford Formation. Unweathered marly clay shale of the Lower Britton Member of the Eagle Ford Formation supports a portion of the outlet works structure from station 27+58 forward, which includes the lower one-third of the chute section and all of the stilling basin. The Lower Britton Member is slightly harder than the Upper Britton Member, and can be distinguished by a tannish-gray coloring and the presence of pockets of sand-sized fossil fish scale remains. The Lower Britton Member is slightly more thickly-bedded and has less jointing and fracturing than does the Upper Britton Member.

4. Overburden. Overburden materials encountered in the Joe Pool Dam Outlet Works excavation are described in Section III of this report and are shown on plate 6. The overburden consisted of Recent floodplain deposits and older Quaternary terrace deposits. In general the exposed overburden in the slopes of the outlet works excavation consisted of, in descending order, silty, sandy, medium stiff clay overlying fine- to medium-grained, clayey, gravelly sand grading down into moderately sandy to clean, sub-angular to rounded, calcareous gravel. The overburden units varied in their mixtures and thicknesses in different sections of the excavation. The overburden contained no significant amounts of ground water.

VII POSSIBLE FUTURE PROBLEMS

1. Conditions That Could Produce Problems. There were no unanticipated foundation conditions discovered during construction of the Joe Pool Outlet Works which would pose a threat to the stability of the structure. All foundation surfaces were competent and stable, and remained so until covered by impervious backfill or protective concrete.

Minor erosion problems may develop in the exposed 1V on 3H clay shale slopes in the approach and discharge channels prior to the establishment of turf during the Embankment and Spillway contract. As the exposed clay shale deteriorates, it becomes highly erodible.

2. Recommendations. Consideration should be given to flat base excavation for the foundation for cut and cover conduits in lieu of V-shaped excavation. V-shaped excavations in hard rock, or in horizontally-bedded, soft-to-moderately hard clay shale, as in this case, inevitably result in overexcavation (see para IV-5). Even though overexcavation is a responsibility of the contractor, it will be considered in claims, and in future excavation cost estimates.

VIII CONTRACT MODIFICATIONS AFFECTING THE FOUNDATION

One contract modification was approved which affected the outlet works foundation. In accordance with the Value Engineering Incentive Program, the contractor submitted a Value Engineering Change Proposal to delete the placement of pneumatic concrete where shown in the plans, specifically in the collar excavations. Under the change the contractor would excavate the collars to grade, install the steel cage in the excavation, and place structural concrete around the cage. The change amounted to a net cost savings of $3,517 which, under the Value Engineering Incentive Program, was split 45 percent - 55 percent between the contractor and the government respectively.

The proposal was reviewed and approved by the SWF Design Branch and Geotechnical Branch with the conditions that the time lapse between excavation and placement of concrete be the same as in all other areas of protective concrete (maximum 2 hours), and that Aerospray 52 moisture sealant be applied to the excavation walls immediately after cleaning. The contractor agreed to the conditions and the contract modification was approved on 19 December 1980.

IX RECORD OF FOUNDATION APPROVAL

CONCRETE PLACEMENT

Station	Location	Date	Start	Stop	AMB Temp	Remarks
27+72-27+96	Stilling Basin	1-29-81	1230	1445	56	to 20' RT
27+96-28+76	" "	1-30-81	1100	1600	32	to 20' RT
27+72-28+00	" "	1-31-81	1300	1500	36	to 20' LT
28+00-28+75	" "	2-02-81	1200	1600	42	to 20' LT
20+00-20+48	Intake Tower	2-04-81	1010	1745	47	Transition
19+65-20+00	" "	2-06-81	1000	1730	42	26' LT to 26' RT
19+15-19+65	" "	2-07-81	0930	1415	45	to 26' RT
19+05-19+65	Appro Slab	2-13-81	1450	1810	52	to 26' LT
18+85-19+15	" "	2-14-81	1135	1230	60	to 26' RT
18+85-19+05	" "	2-14-81	1250	1320	60	to 26' LT
20+49.5-20+66.5	Conduit	2-16-81	1300	1700	71	Monolith 1
20+66.5-20+69.5	"	2-18-81	1515	1545	70	Collar 1-2
20+69.5-20+86.5	"	2-18-81	1615	1750	70	Monolith 2
20+89.5-21+06.5	"	2-19-81	1130	1245	60	Monolith 3
21+09.5-21+26.5	"	2-19-81	1300	1415	60	Monolith 4
21+29.5-21+46.5	"	2-19-81	1615	1845	60	Monolith 5
21+49.5-21+66.5	"	2-20-81	1215	1325	75	Monolith 6
21+69.5-21+86.5	"	2-20-81	1415	1550	75	Monolith 7
27+34-27+50	Chute	2-24-81	1440	1630	75	±15' LT to ±15' RT
27+50-27+72	"	2-25-81	1345	1945	69	±18' LT to ±18' RT
20+86.5-20+89.5	Conduit	2-26-81	1400	1445	74	Collar 2-3
21+06.5-21+09.5	"	2-26-81	1600	1635	74	Collar 3-4
21+26.5-21+29.5	"	2-26-81	1810	1900	74	Collar 4-5

RECORD OF FOUNDATION APPROVAL (cont'd)

CONCRETE PLACEMENT

Station	Location	Date	Start	Stop	AMB Temp	Remarks
21+46.5-21+49.5	Conduit	2-27-81	1700	1800	68	Collar 5-6
21+66.5-21+69.5	"	2-28-81	1100	1140	63	Collar 6-7
		3-05-81	1600	1645	60	
21+89.5-22+06.5	"	3-10-81	1300	1415	65	Monolith 8
22+09.5-22+26.5	"	3-11-81	1315	1500	64	Monolith 9
22+29.5-22+46.5	"	3-11-81	1545	1710	64	Monolith 10
27+10-27+34	Chute	3-12-81	1235	1500	64	±12' LT to ±12' RT
22+49.5-22+66.5	Conduit	3-13-81	1245	1430	70	Monolith 11
22+69.5-22+86.5	"	3-13-81	1500	1630	70	Monolith 12
21+86.5-21+89.5	"	3-14-81	0900	0930	60	Collar 7-8
22+89.5-23+06.5	"	3-16-81	1240	1340	65	Monolith 13
23+09.5-23+26.5	"	3-16-81	1430	1545	65	Monolith 14
28+76-28+85	Stilling Basin	3-17-81	1640	1730	49	Key
22+06.5-22+09.5	Conduit	3-18-81	1500	1730	59	Collar 8-9
23+29.5-23+46.5	"	3-19-81	1120	1240	65	Monolith 15
23+49.5-23+66.5	"	3-23-81	1230	1350	60	Monolith 16
23+69.5-23+86.5	"	3-24-81	1310	1445	62	Monolith 17
23+89.5-24+06.5	"	3-24-81	1530	1620	62	Monolith 18
23+06.5-23+09.5	"	3-25-81	1200	1310	65	Collar 13-14
23+26.5-23+29.5	"	3-25-81	1350	1500	65	Collar 14-15
22+46.5-22+49.5	"	3-26-81	1720	1800	73	Collar 10-11
22+26.5-22+29.5	"	3-27-81	1015	1100	60	Collar 9-10
22+66.5-22+69.5	"	3-27-81	1210	1245	60	Collar 11-12

RECORD OF FOUNDATION APPROVAL (cont'd)

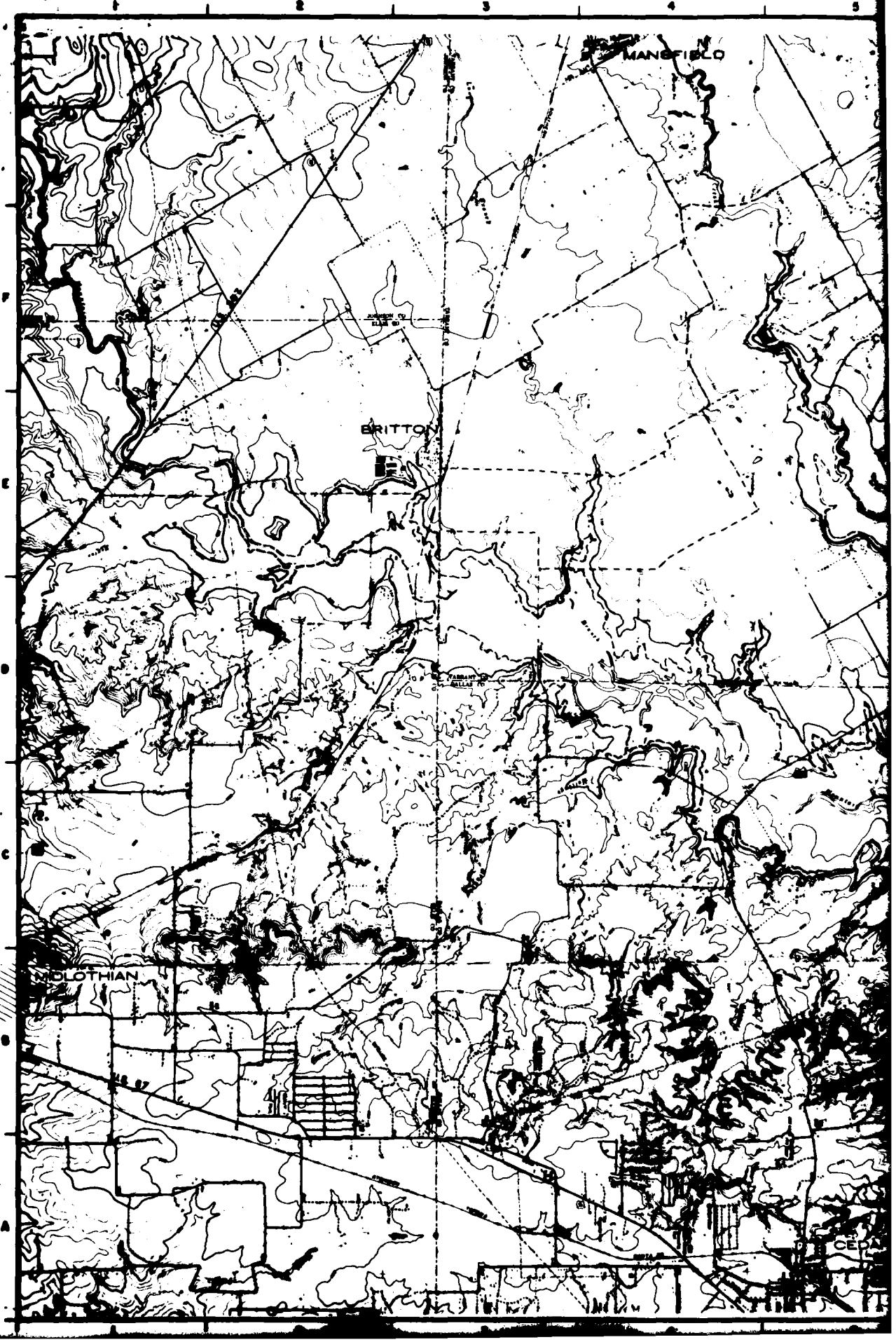
Station	Location	CONCRETE PLACEMENT Date	Start	Stop	AMB Temp	Remarks
22+86.5-22+89.5	Conduit	3-27-81	1430	1515	60	Collar 12-13
24+09.5-24+26.5	"	4-01-81	1600	1710	84	Monolith 19
24+29.5-24+46.5	"	4-02-81	1335	1450	72	Monolith 20
24+49.5-24+66.5	"	4-03-81	1200	1250	71	Monolith 21
24+69.5-24+86.5	"	4-0- 81	1255	1405	67	Monolith 22
24+89.5-25+06.5	"	4-06-81	1550	1710	67	Monolith 23
25+09.5-25+26.5	"	4-07-81	1445	1645	74	Monolith 24
25+29.5-25+46.5	"	4-08-81	1100	1230	70	Monolith 25
25+49.5-25+66.5	"	4-08-81	1330	1500	70	Monolith 26
23+66.5-23+68.5	"	4-08-81	1415	1500	71	Collar 16-17
23+86.5-23+89.5	"	4-09-81	1215	1240	79	Collar 17-18
24+26.5-24+29.5	"	4-09-81	1310	1340	79	Collar 18-19
25+89.5-26+06.5	"	4-10-81	1125	1240	77	Monolith 27
26+09.5-26+26.5	"	4-10-81	1350	1440	77	Monolith 28
26+29.5-26+46.5	"	4-10-81	1655	1810	77	Monolith 29
24+26.5-24+29.5	"	4-11-81	1300	1330	76	Collar 19-20
26+49.5-26+66.5	"	4-13-81	1130	1345	78	Monolith 30
26+69.5-26+86.5	"	4-13-81	1430	1645	78	Monolith 31
26+66.5-26+69.5	"	4-14-81	1030	1130	68	Collar 30-31
24+46.5-24+49.5	"	4-15-81	0925	1000	60	Collar 20-21
24+66.5-24+69.5	"	4-15-81	1040	1110	60	Collar 21-22
24+86.5-24+89.5	"	4-15-81	1130	1230	60	Collar 22-23
25+06.5-25+09.5	"	4-15-81	1350	1435	60	Collar 23-24

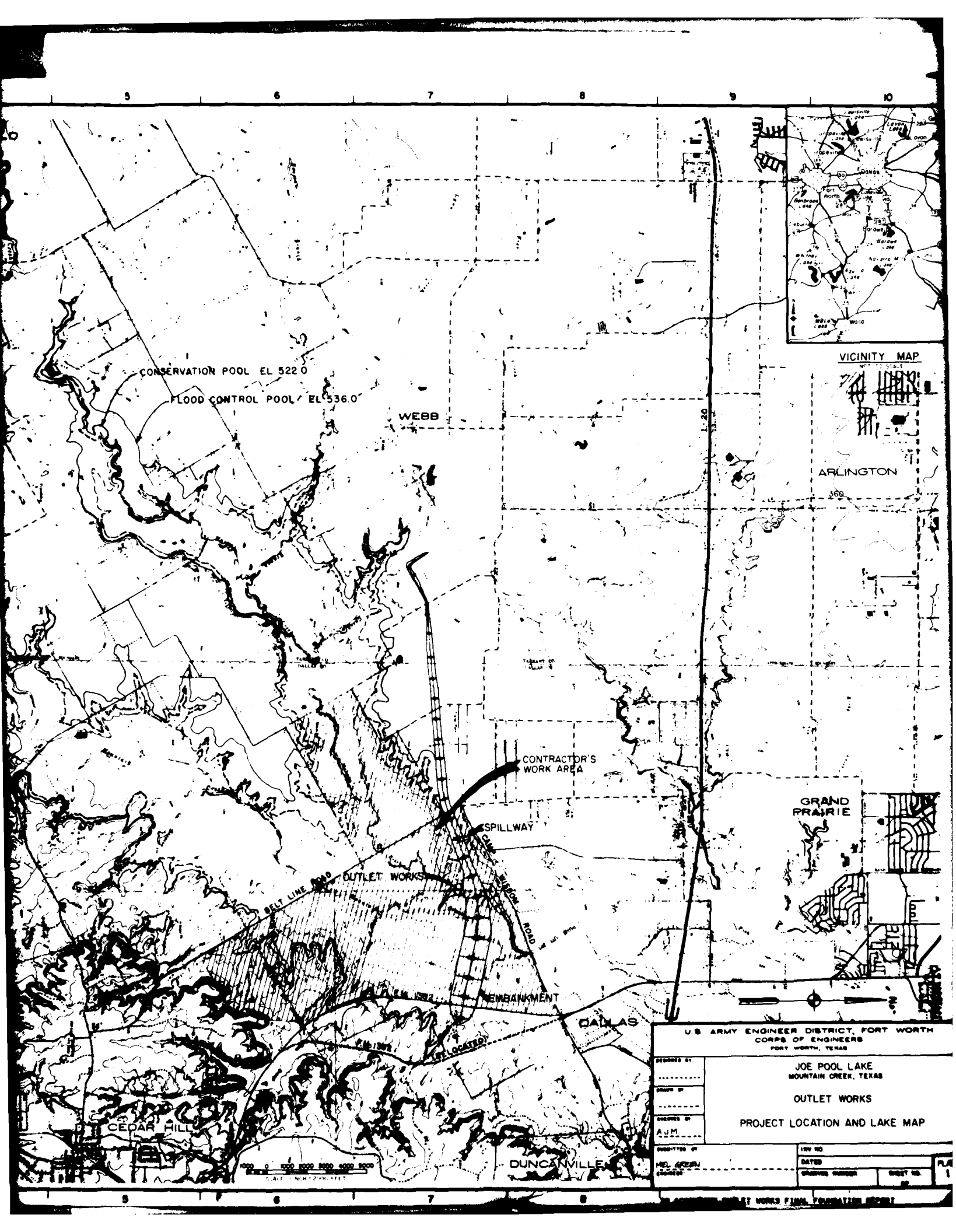
RECORD OF FOUNDATION APPROVAL (cont'd)

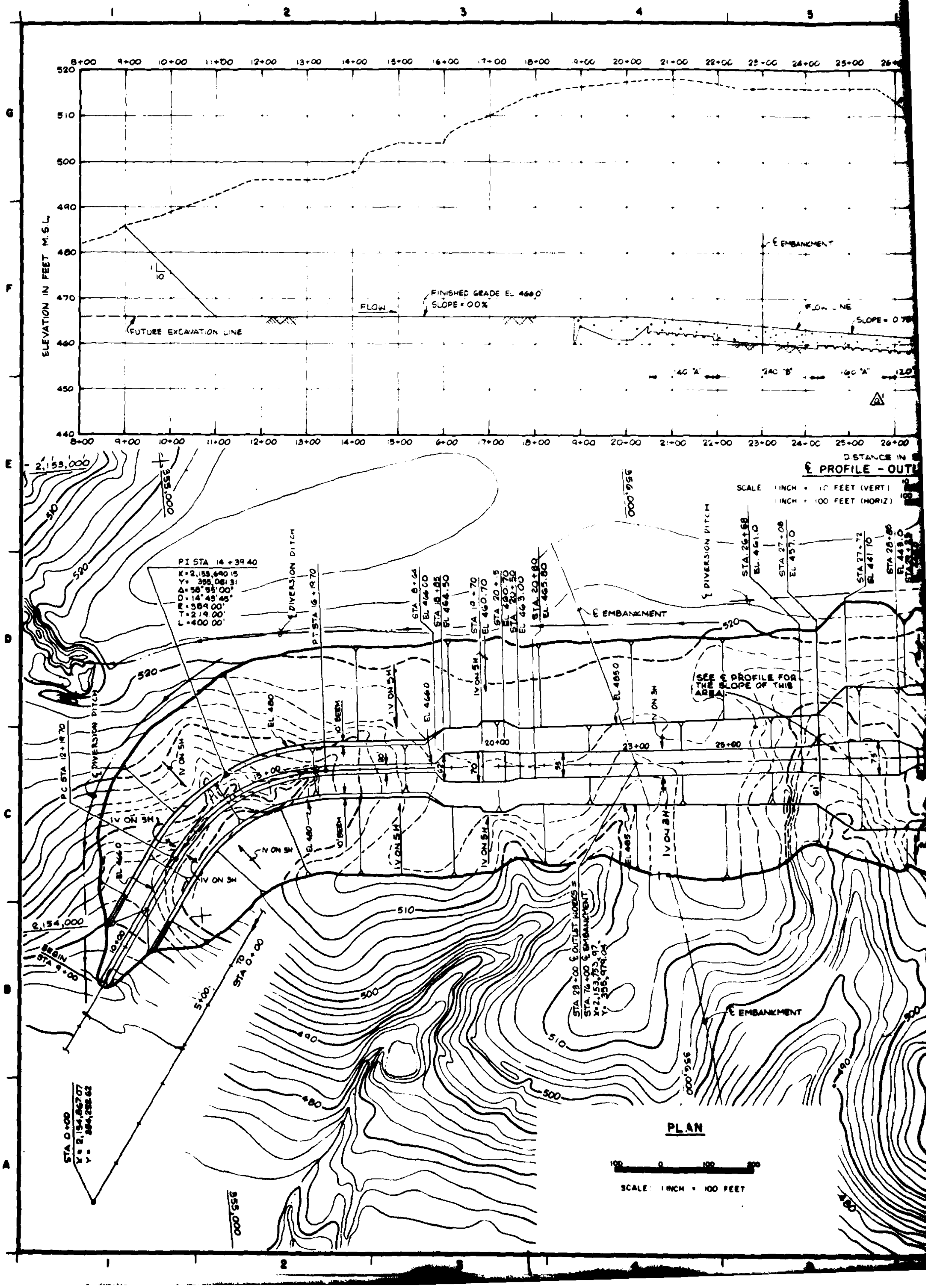
CONCRETE PLACEMENT

Station	Location	Date	Start	Stop	AMB Temp	Remarks
25+26.5-25+29.5	Conduit	4-15-81	1500	1600	60	Collar 24-25
25+46.5-25+49.5	"	4-15-81	1645	1720	60	Collar 25-26
25+66.5-25+69.5	"	4-15-81	1750	1835	60	Collar 26-27
26+89.5-27+06.5	"	4-16-81	1420	1600	87	Monolith 32
27+09.5-27+26.5	"	4-16-81	1645	1855	87	Monolith 33
26+06.5-26+09.5	"	4-17-81	1000	1025	80	Collar 27-28
26+26.5-26+29.5	"	4-17-81	1110	1215	80	Collar 28-29
26+46.5-26+49.5	"	4-17-81	1300	1325	80	Collar 29-30
26+66.5-26+69.5	"	4-17-81	1350	1430	80	Collar 30-31
26+86.5-26+89.5	"	4-17-81	1445	1530	80	Collar 31-32
27+06.5-27+09.5	"	4-17-81	1550	1630	80	Collar 32-33

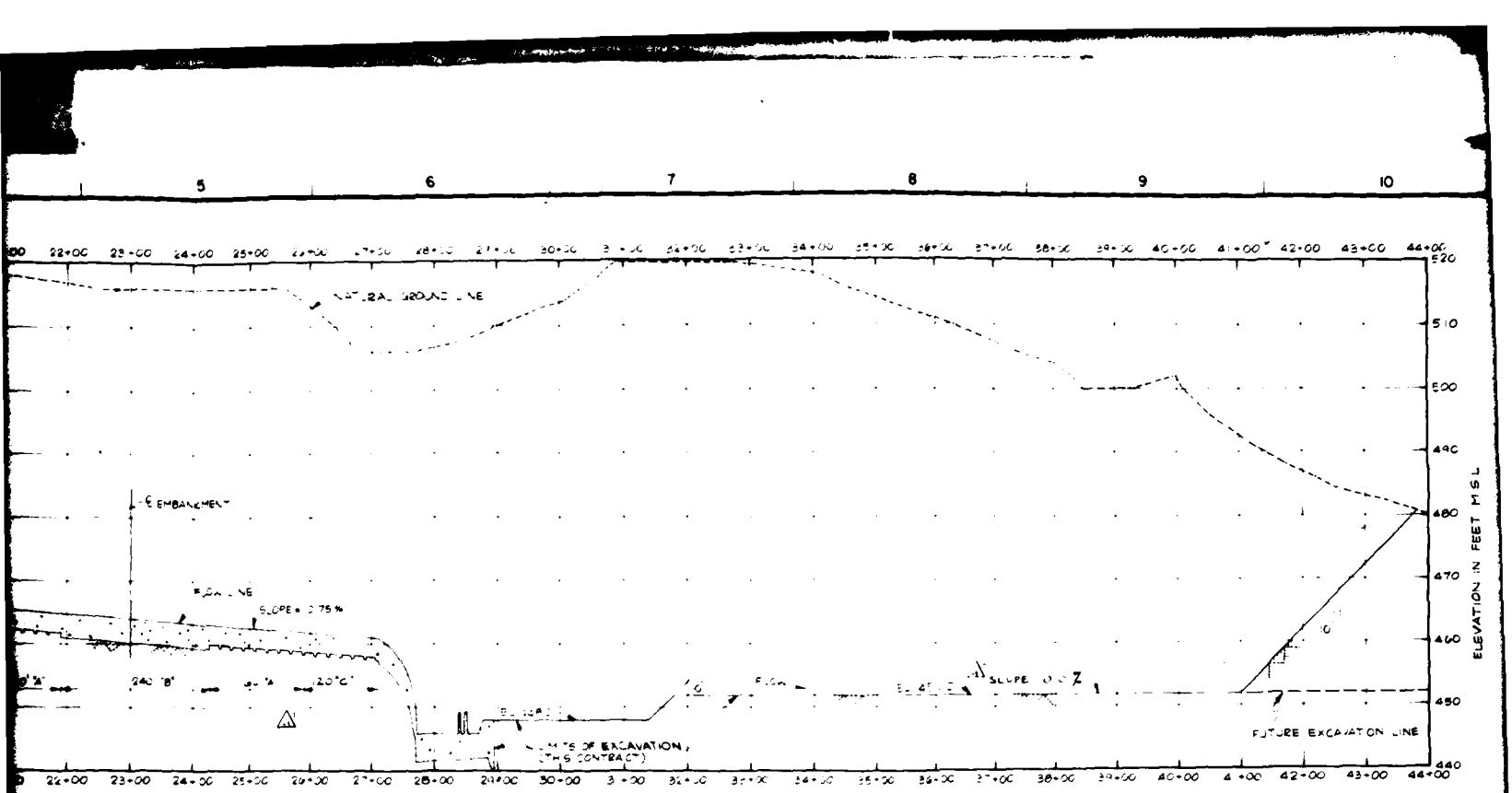
NOTE: The contract specified that the clay shale surface be sealed with a resin-type sealer (Aerospray 52) within 15 minutes after reaching final grade and covered with protective concrete within 2 hours after reaching final grade. The contractor made a sincere effort, and in most instances, met the time limitations required by the contract. Mapping of the foundation was accomplished during the time span between excavation and encasement, usually immediately following surface cleaning. Approval of the foundation surface occurred immediately before placement of protective concrete.


1
2
3
4
5
A
B
C
D
E
F
MANSFIELD
BRITTON
MIDLOTHIAN


CONSERVATION POOL EL 522.0
FLOOD CONTROL POOL EL 536.0
WEBB
ARLINGTON
VICINITY MAP
CONTRACTOR'S WORK AREA
SPILLWAY
OUTLET WORKS
BELT LINE ROAD
EMBANKMENT
GRAND PRAIRIE
DALLAS
CEDAR HILL
DUNCANVILLE
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
JOE POOL LAKE
MOUNTAIN CREEK, TEXAS
OUTLET WORKS
PROJECT LOCATION AND LAKE MAP

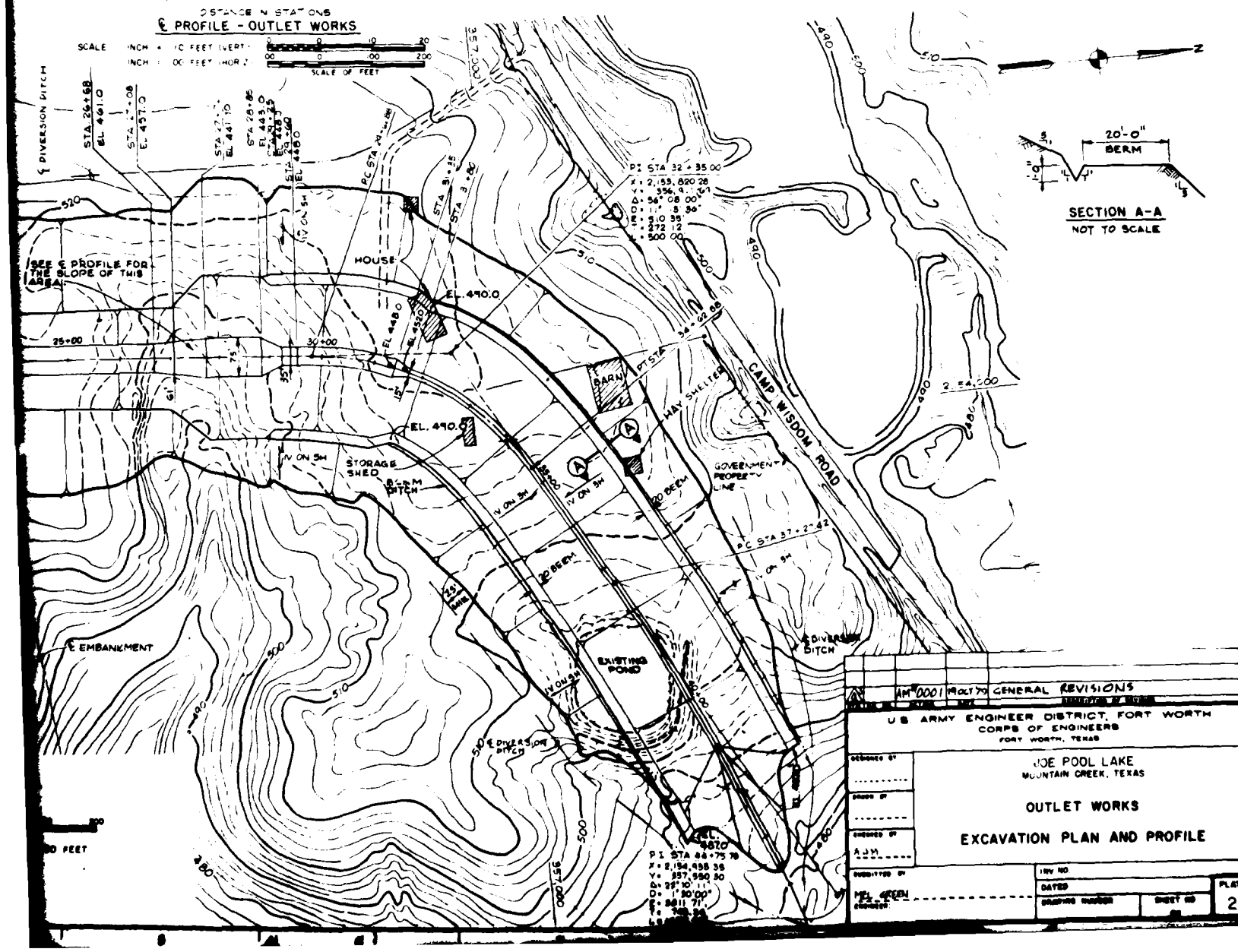


ELEVATION IN FEET M.S.L.
FINISHED GRADE EL 466.0'
SLOPE = 0.0%
FLOW
FUTURE EXCAVATION LINE
℄ EMBANKMENT
FLOW LINE
DISTANCE IN
℄ PROFILE - OUT
SCALE 1 INCH = 10 FEET (VERT)
1 INCH = 100 FEET (HORIZ)
PI STA 14 + 39.40
X=2,153,690.15
Y= 355,081.31
Δ=58°55'00"
D=14°45'45"
R=389.00'
T=219.00'
L=400.00'
℄ DIVERSION DITCH
PT STA 16 + 19.70
PC STA 12 + 19.70
℄ EMBANKMENT
SEE ℄ PROFILE FOR THE SLOPE OF THIS AREA
1V ON 5H
10' BERM
BEGIN STA 9 + 00
STA 0 + 00
STA 28+00 ℄ OUTLET WORKS = STA 76+00 ℄ EMBANKMENT
X=2,153,753.97
Y= 355,479.04
STA 0+00
X = 2,154,867.07
Y = 354,292.62
PLAN
SCALE 1 INCH = 100 FEET



℄ PROFILE - OUTLET WORKS

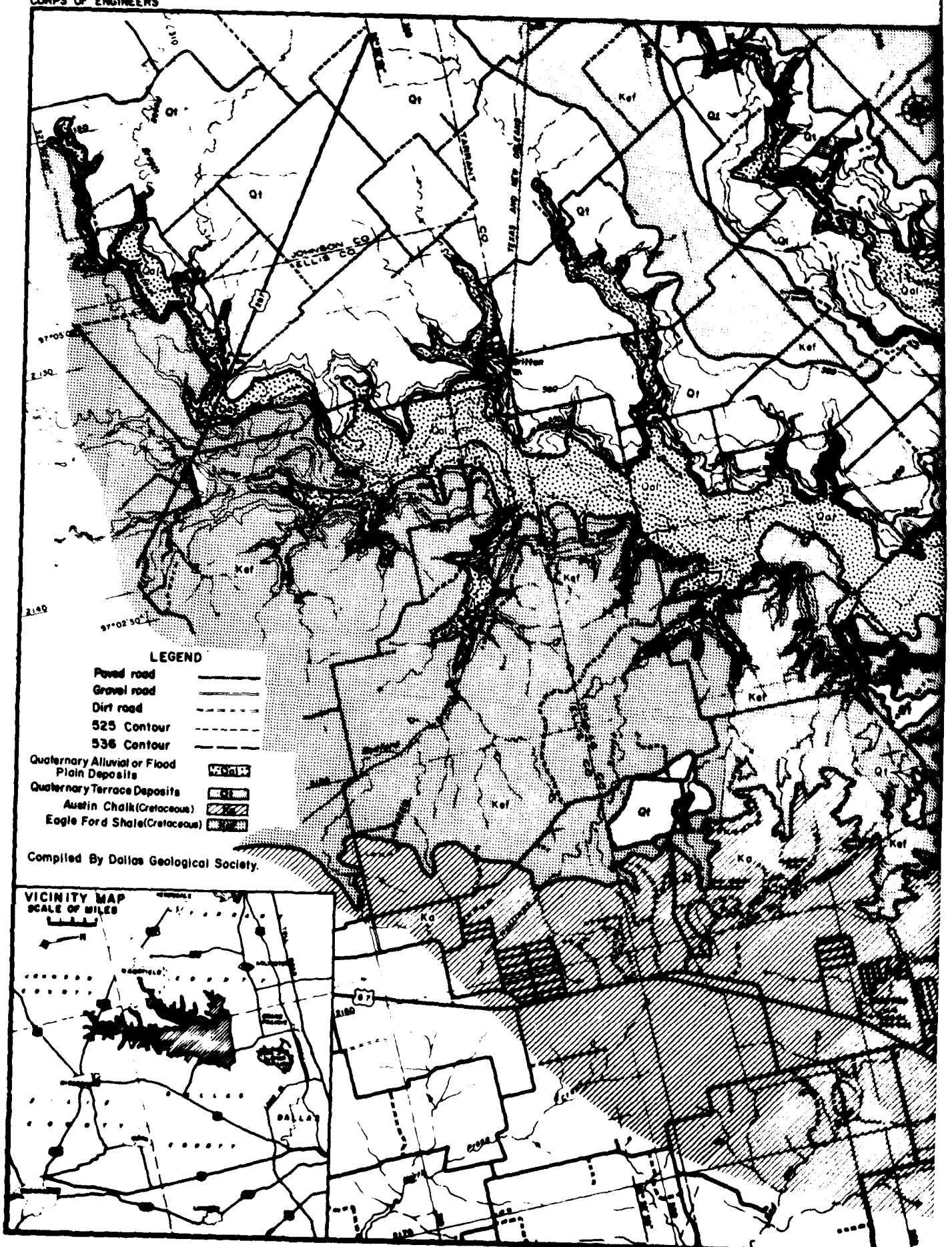
SCALE: 1 INCH = 10 FEET (VERT.)
1 INCH = 100 FEET (HOR.)
SCALE OF FEET



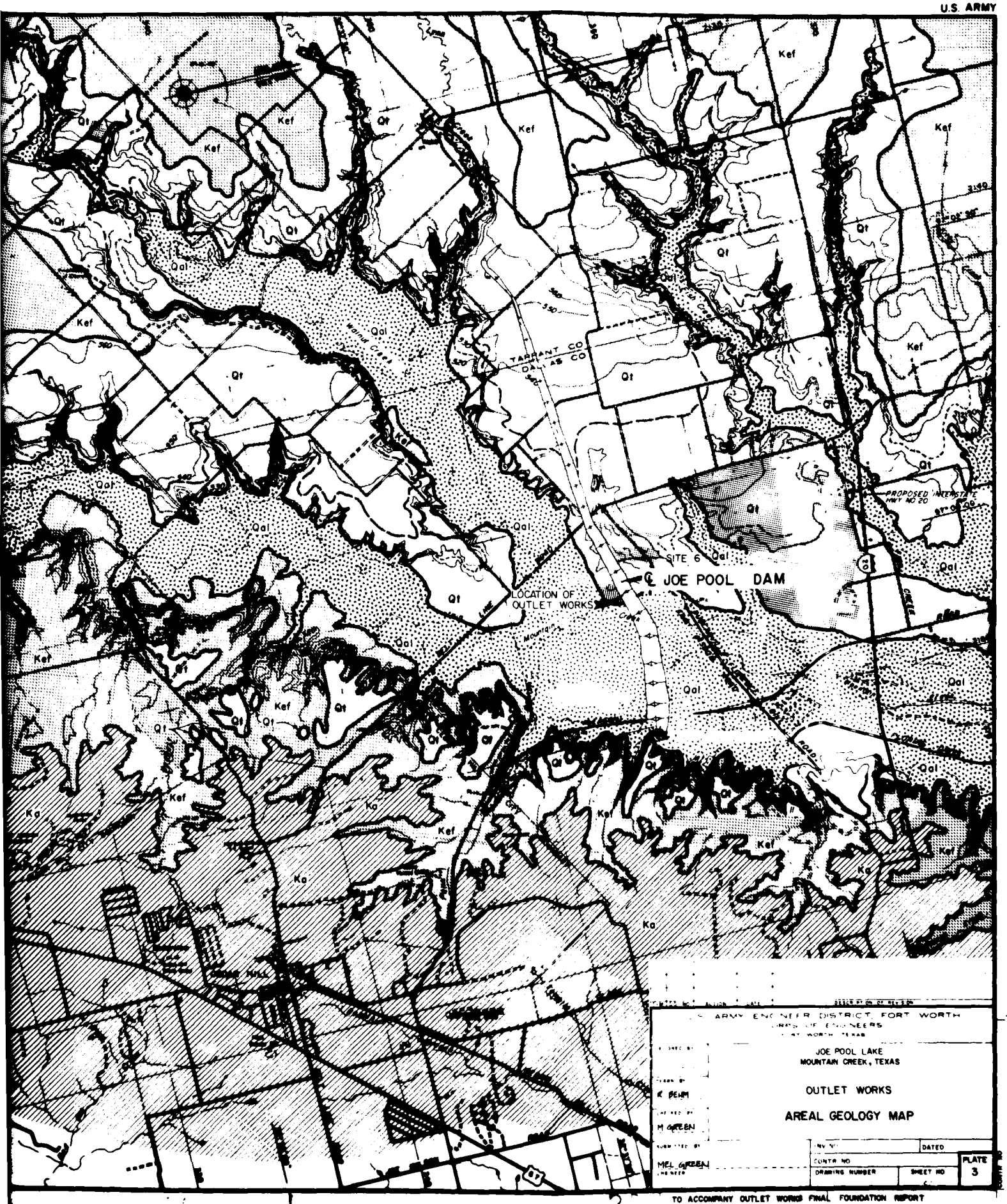
SECTION A-A
NOT TO SCALE

AM 0001	14 Oct 79 GENERAL REVISIONS
U S ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS	
DESIGNED BY	JOE POOL LAKE MOUNTAIN CREEK, TEXAS
DRAWN BY	OUTLET WORKS
CHECKED BY AJM	EXCAVATION PLAN AND PROFILE
SUBMITTED BY	IDENT NO
	DATED
	DRAWING NUMBER
	SHEET NO
	PLATE 2

CORPS OF ENGINEERS



U.S. ARMY



ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS

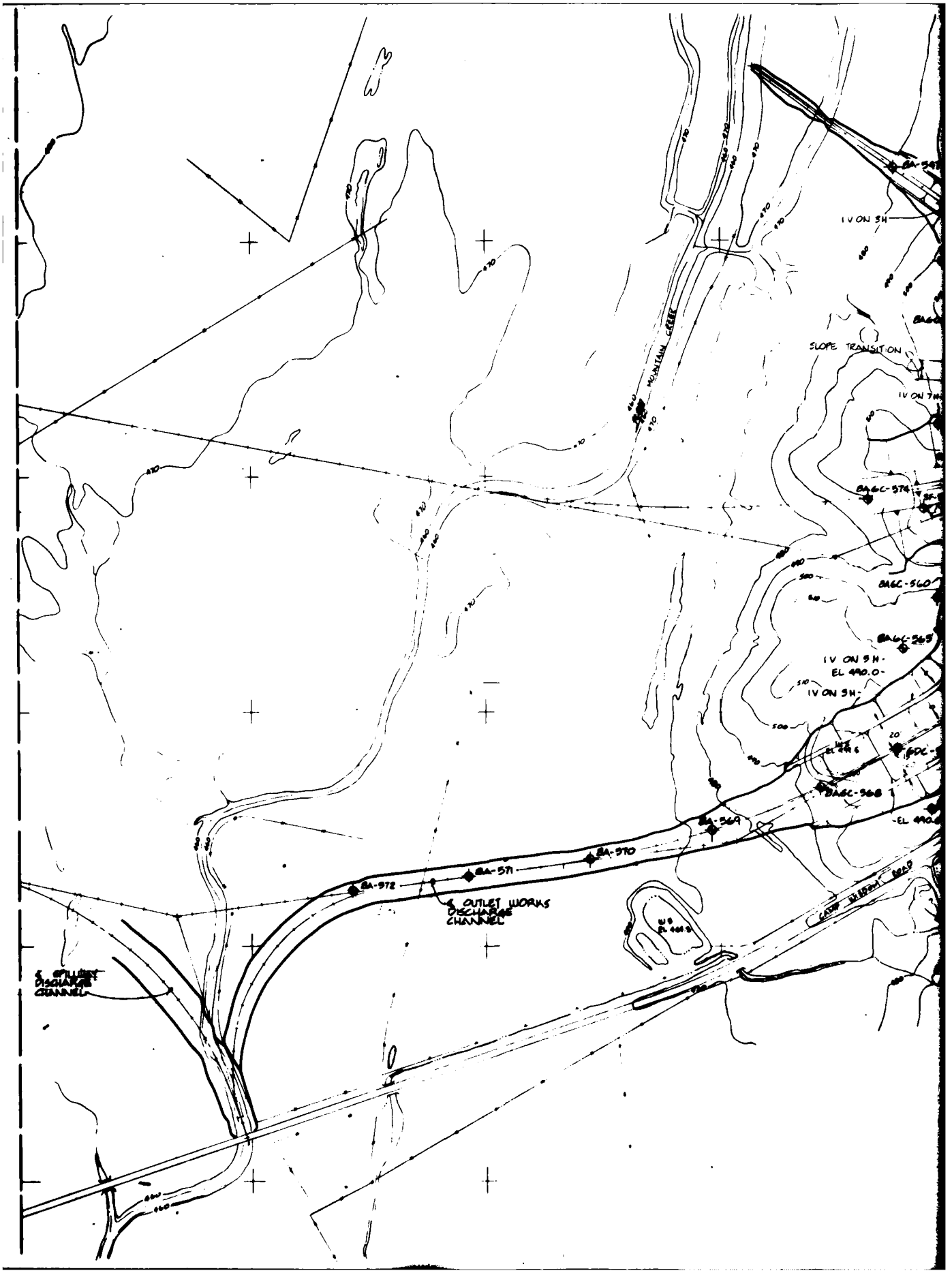
AREAL GEOLOGY MAP

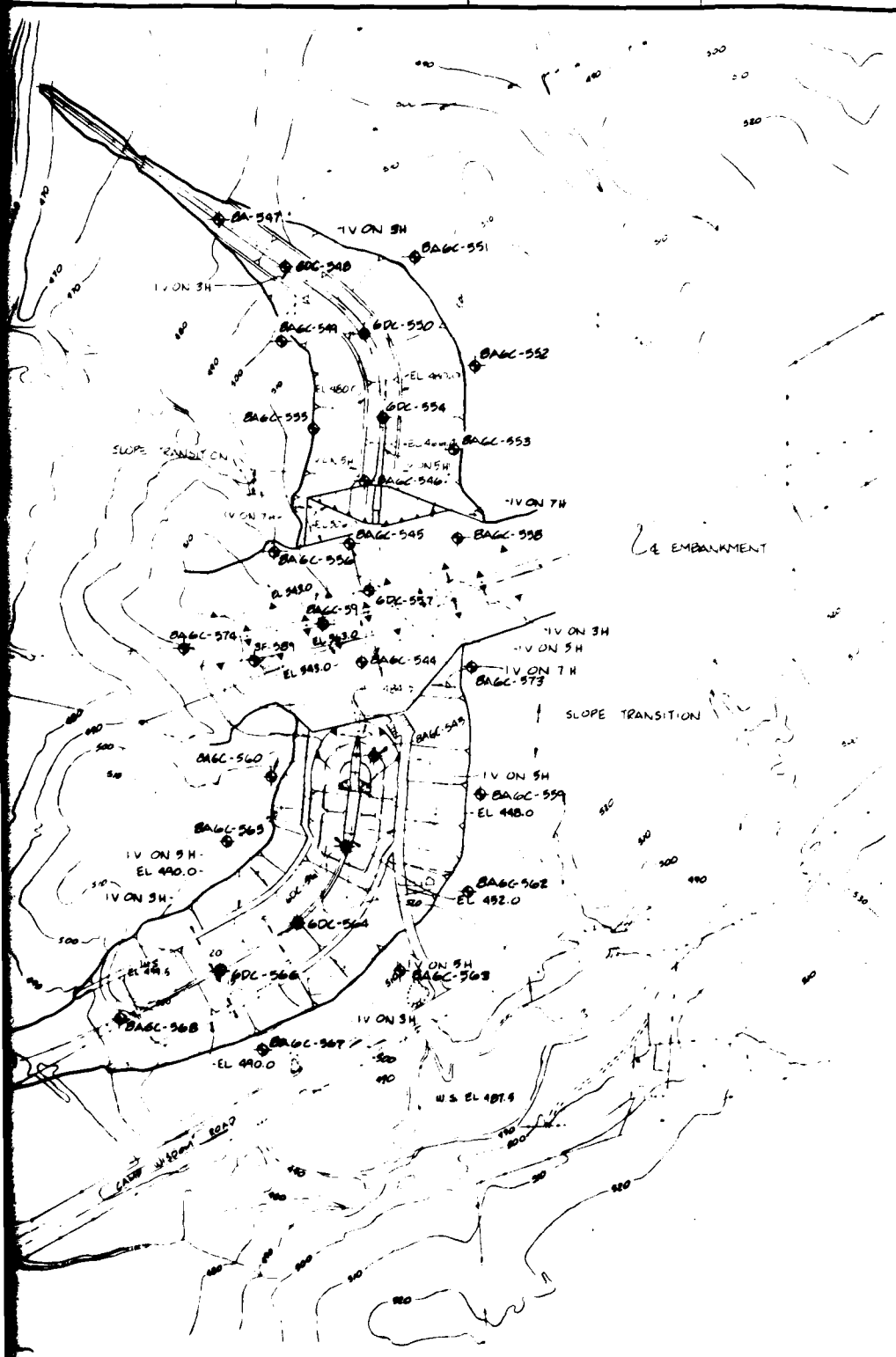
DESIGNED BY: K. BEHM
DRAWN BY:
TRACED BY:
CHECKED BY: M. GREEN
SUBMITTED BY: MEL GREEN
CHIEF

REVISED | DATED
CONTR NO
DRAWING NUMBER | SHEET NO

PLATE 3

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT


1V ON 5H
SLOPE TRANSITION
1V ON 7H
MOUNTAIN CREEK
BA-574
BAGC-560
BAGC-565
1V ON 5H-
EL 490.0-
1V ON 5H-
BAGC-568
BA-569
BA-570
BA-571
BA-572
OUTLET WORKS DISCHARGE CHANNEL
OUTLET WORKS DISCHARGE CHANNEL



NOTES:

1. FOR LOGS OF BORINGS SEE PLATES 12 THRU 25.

SCALE IN FEET

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

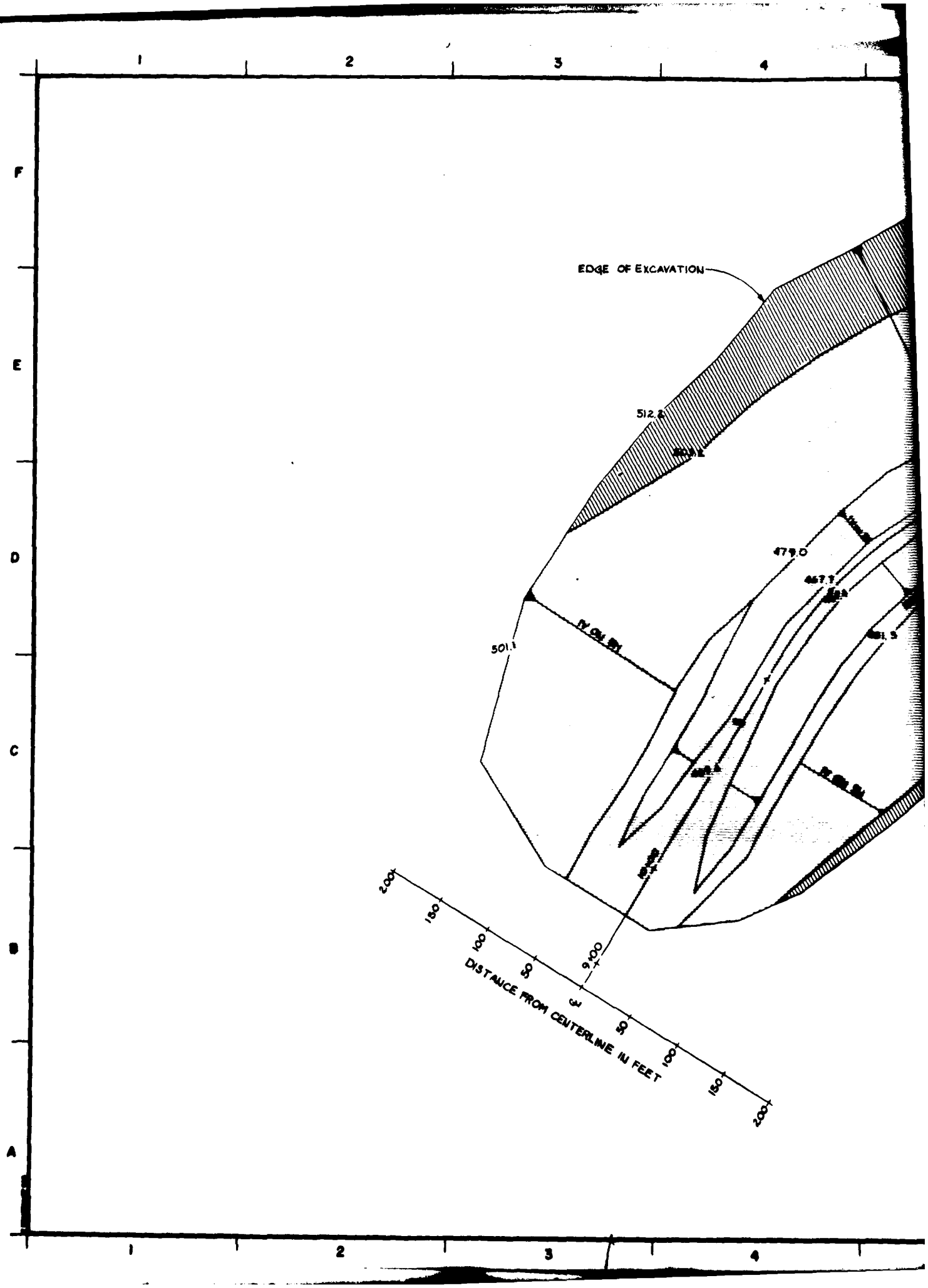
OUTLET WORKS

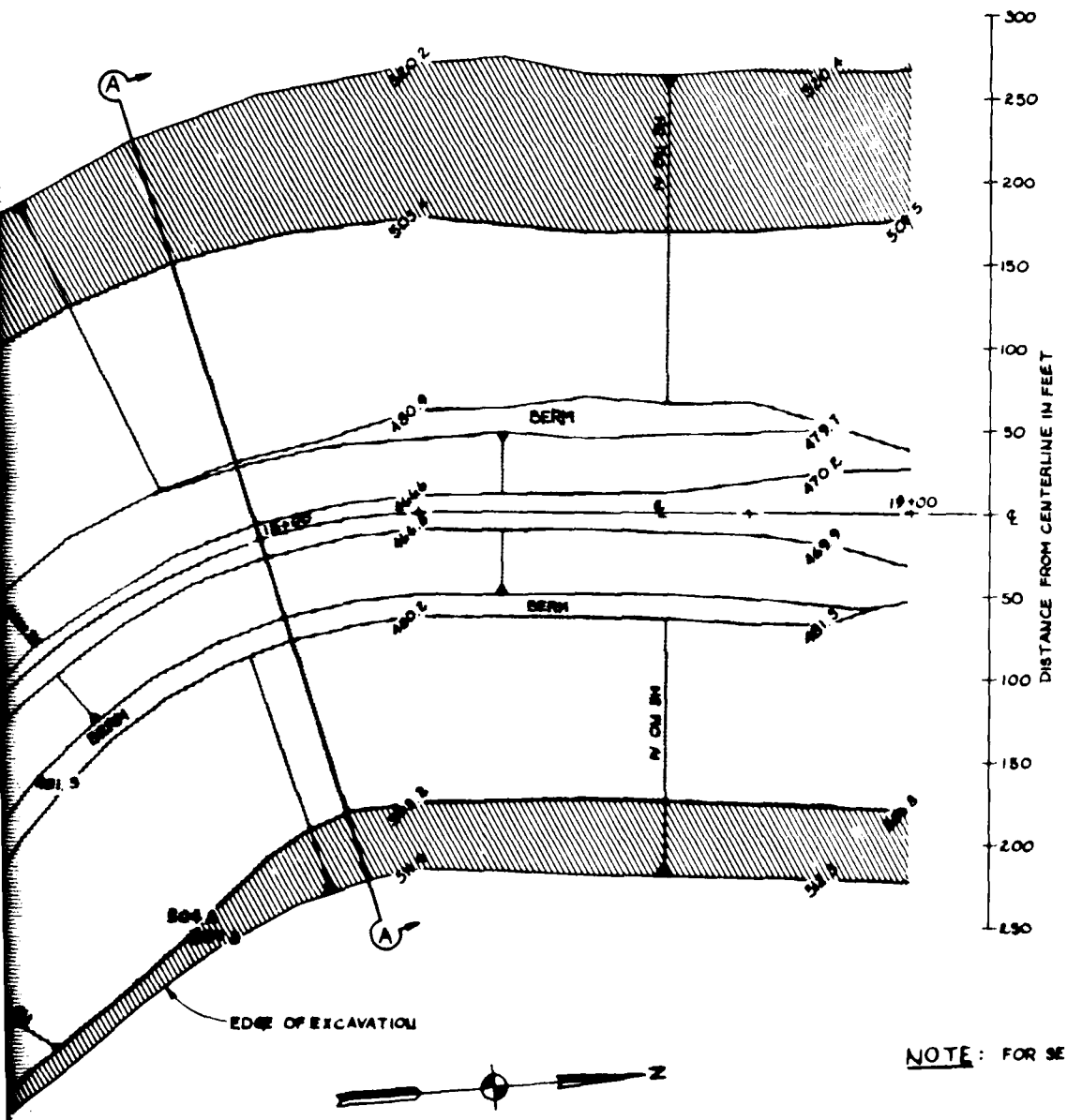
PLAN OF BORINGS

DESIGNED BY
DRAWN BY R. DENM
CHECKED BY M. GREEN
SUBMITTED BY MEL GREEN ENGINEER

DATED
CONTR. NO.
DRAWING NUMBER
SHEET NO.

PLATE 4


EDGE OF EXCAVATION
512.2
501.1
477.0
467.7
200
150
100
50
0
50
100
150
200
DISTANCE FROM CENTERLINE IN FEET



NOTE: FOR SECTION A-A SEE PLATE 9

LEGEND

- OVERBURDEN
- UPPER BRITTON FM

U.S. ARMY ENGINEER
CORPS
FORT

DESIGNED BY: A. MIER

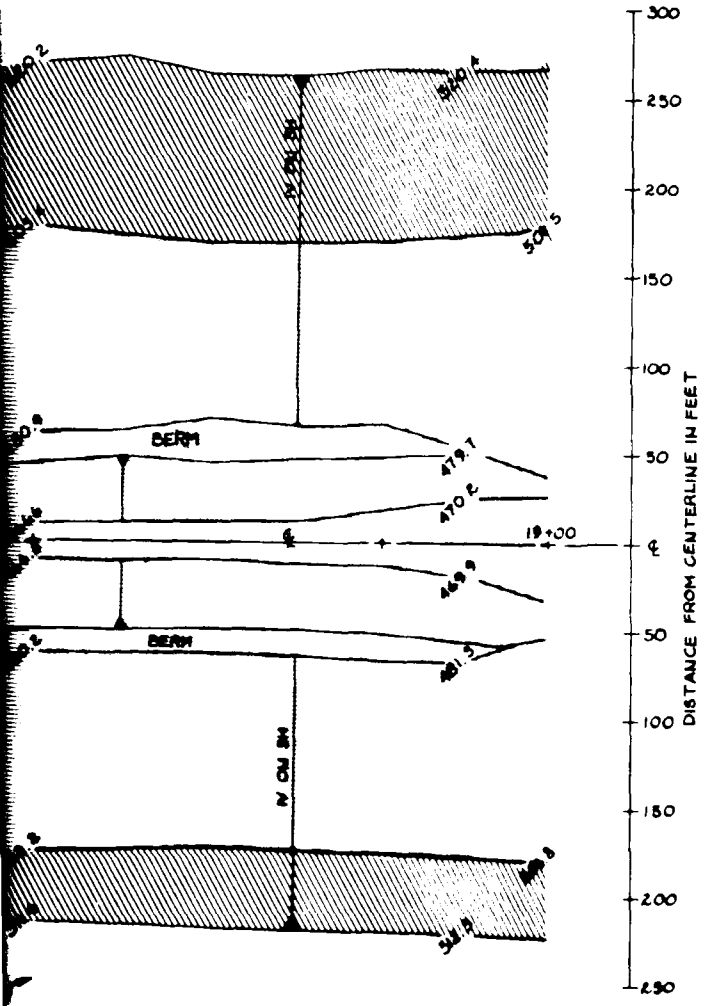
DRAWN BY: M. CASTILLON

CHECKED BY: M. GREEN

SUBMITTED BY: MEL GREEN
ENGINEER:

AS-BU
STATIC

TO ACCOMPANY OUTLET WORKS FIN



NOTE: FOR SECTION A-A SEE PLATE 9

LEGEND

OVERBURDEN

UPPER BRITTON FM

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: A. MAIER
DRAWN BY: M. CASTELLON
CHECKED BY: M. GREEN
SUBMITTED BY: MEL GREEN
ENGINEER:

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS

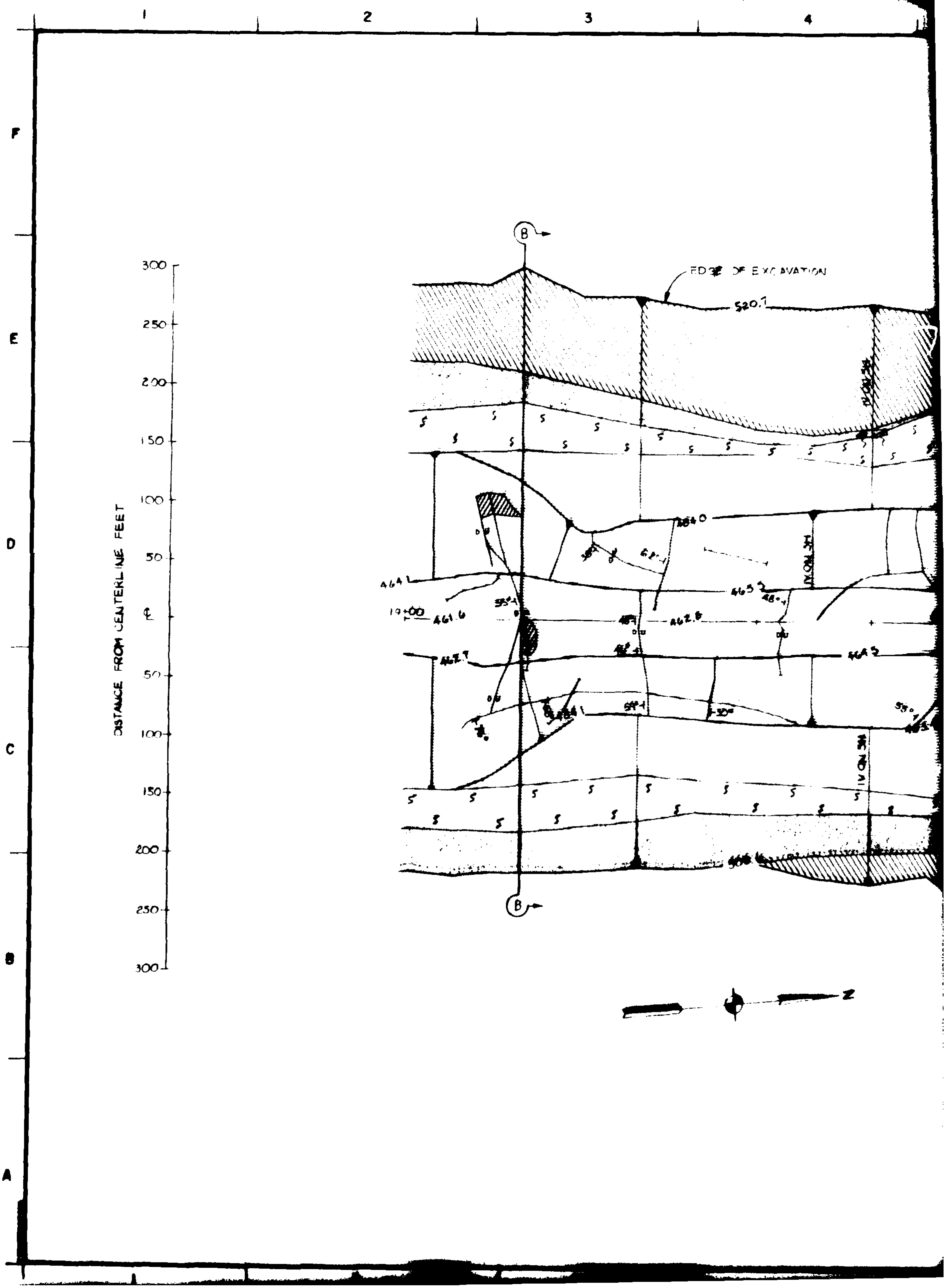
AS-BUILT EXCAVATION PLAN

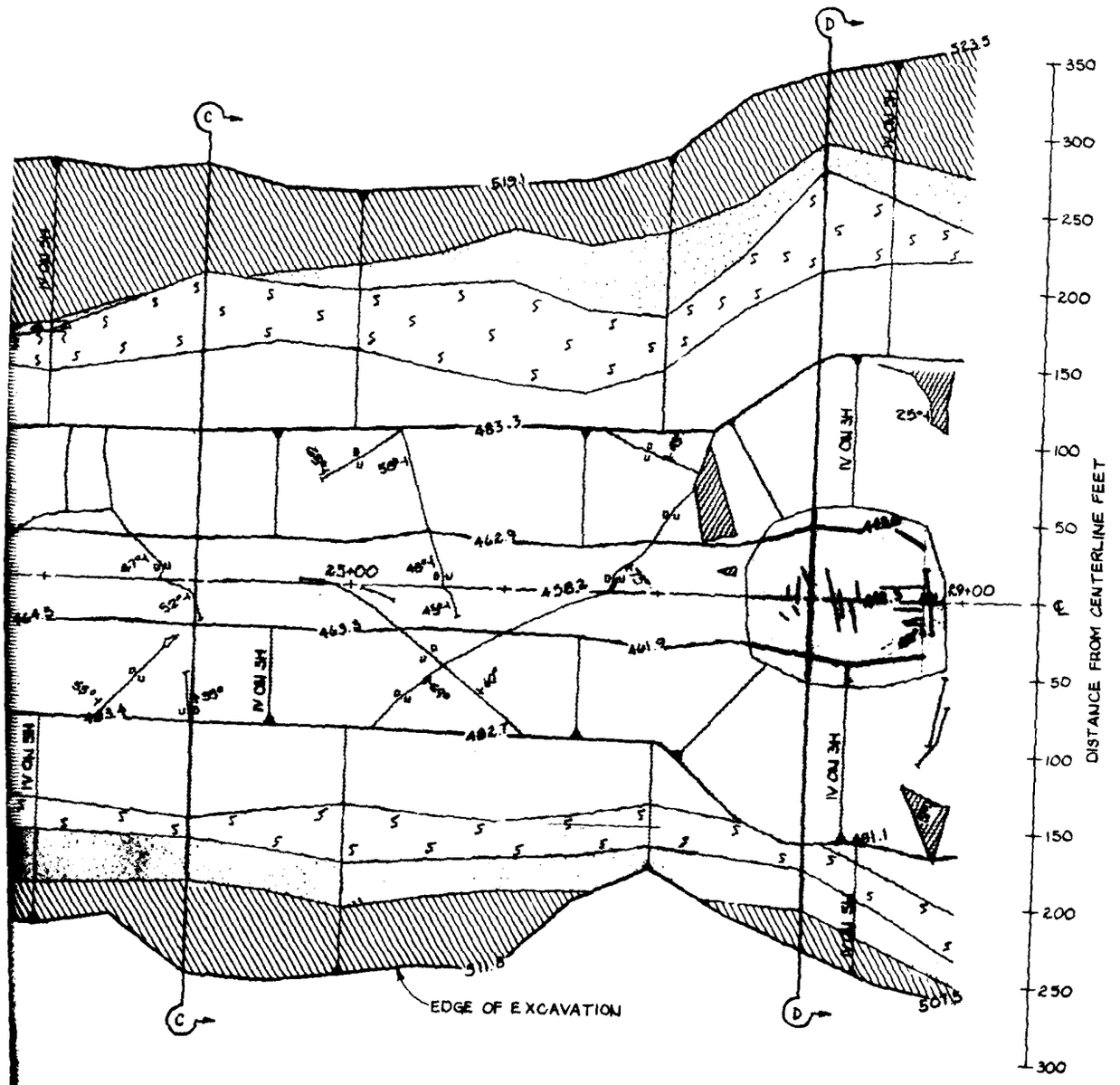
STATION 9+00 THRU STATION 19+00

INV NO. | DATED
CONTR NO
DRAWING NUMBER | SHEET NO. OF

PLATE 5

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT


1
2
3
4
F
E
D
C
B
A
DISTANCE FROM CENTERLINE FEET
300
250
200
150
100
50
℄
50
100
150
200
250
300
EDGE OF EXCAVATION
520.7
B
B
19+00
461.6
464.0
462.6
463.5



NOTE: 1. FOR SECTIONS SEE PLATES 9 & 10

LEGE

CLAY

SAND & GRAVEL

UPPER BRITTON

UPPER BRITTON

LOWER BRITTON

FAULT OR JOI
NW-SE DIP 4
U D OF FAULT.

ZONE OF JOI

SEEPAGE ARE

U.S. ARMY E

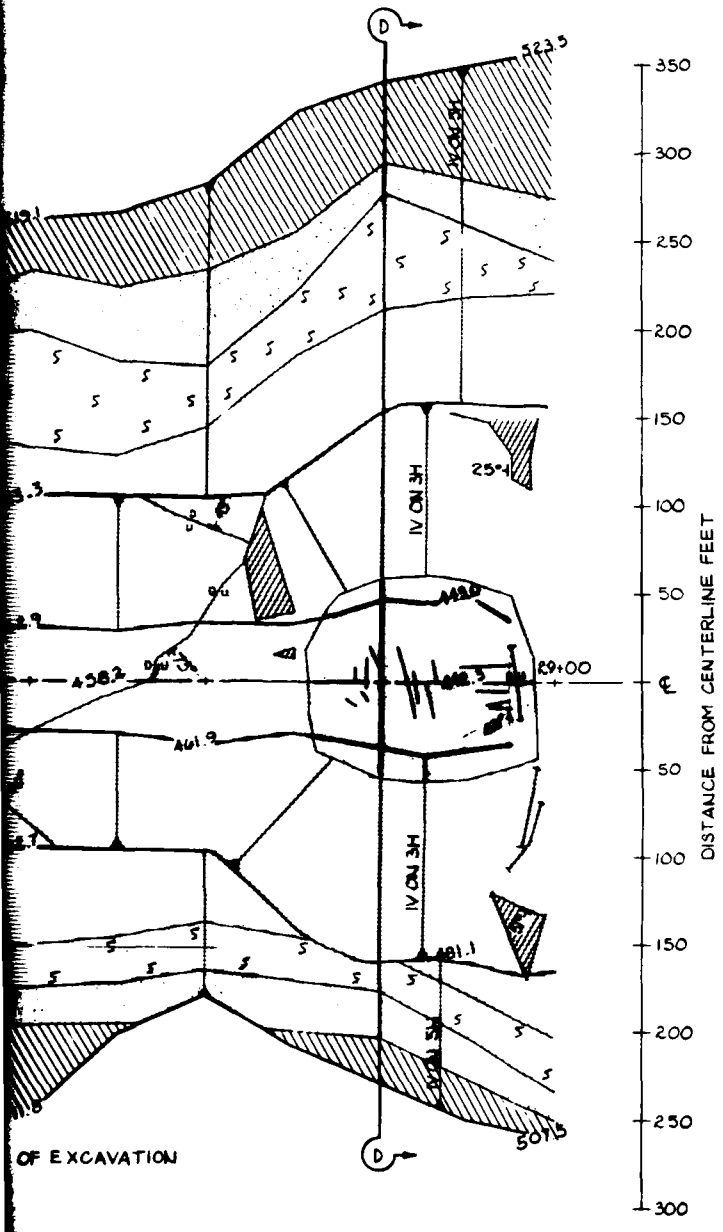
DESIGNED BY: A.MARR

DRAWN BY: M. CASTELLÓN

CHECKED BY: M. GREEN

SUBMITTED BY: M. GREEN ENGINEER

AS-BU



NOTE: 1. FOR SECTIONS SEE PLATES 9 & 10

LEGEND

- CLAY
- SAND & GRAVEL
- UPPER BRITTON FM, WEATHERED
- UPPER BRITTON FM, UNWEATHERED
- LOWER BRITTON FM
- FAULT OR JOINT EXPOSED ON SURFACE. STRIKE NW-SE DIP 45°NE DOWNTHROWN SIDE ON NE SIDE OF FAULT.
- ZONE OF JOINTED OR BROKEN PRIMARY
- SEEPAGE AREA

SYM	DG NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: A.MARR
DRAWN BY: M. CASTELLÓN
CHECKED BY: M. GREEN

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS

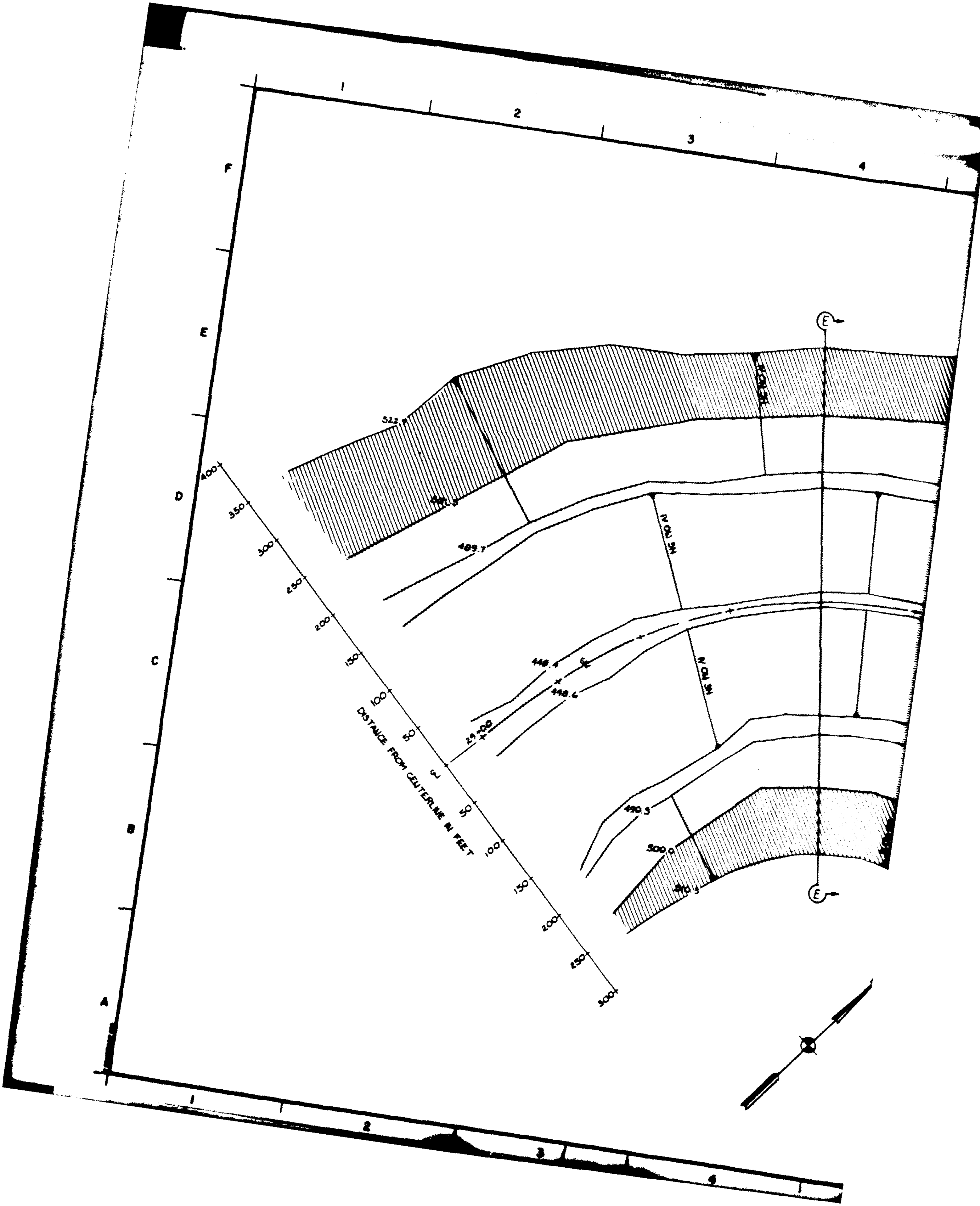
AS-BUILT FOUNDATION EXCAVATION PLAN
STATION 19+00 THRU STATION 29+00

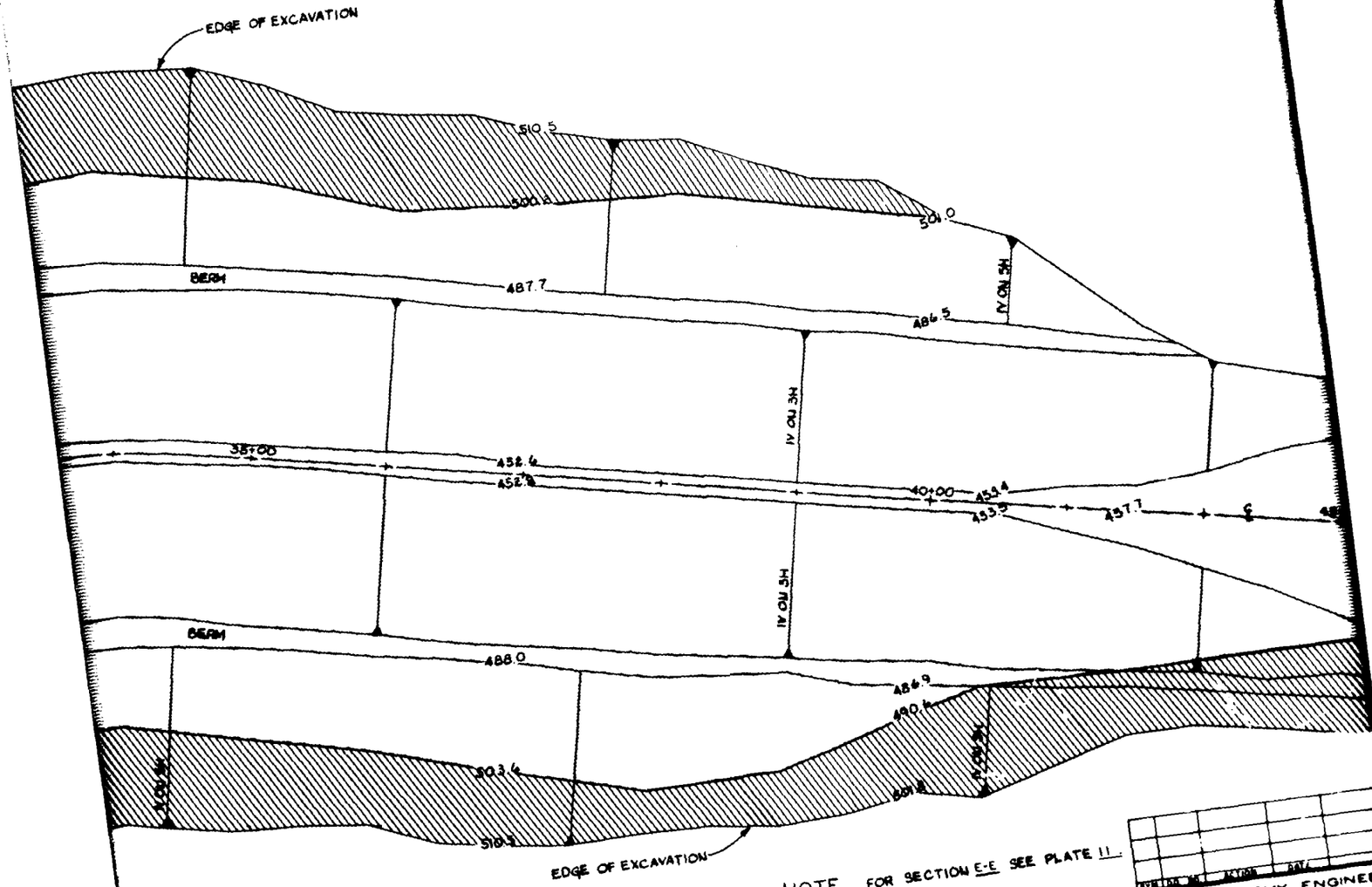
SUBMITTED BY: M. GREEN, ENGINEER

INV NO. | DATED
CONTR NO
DRAWING NUMBER | SHEET NO. OF

PLATE 6

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT


1
2
3
4
F
E
D
C
B
A
E
E
522.8
489.7
448.4
448.6
29+00
490.3
500.0
400
350
300
250
200
150
100
50
50
100
150
200
250
300
DISTANCE FROM CENTERLINE IN FEET



NOTE FOR SECTION E-E SEE PLATE 11.

LEGEND

OVERBURDEN

UPPER BRITTON FM

U.S. ARMY ENGINEER
CORPS
FORT

DESIGNED BY A. MAIER

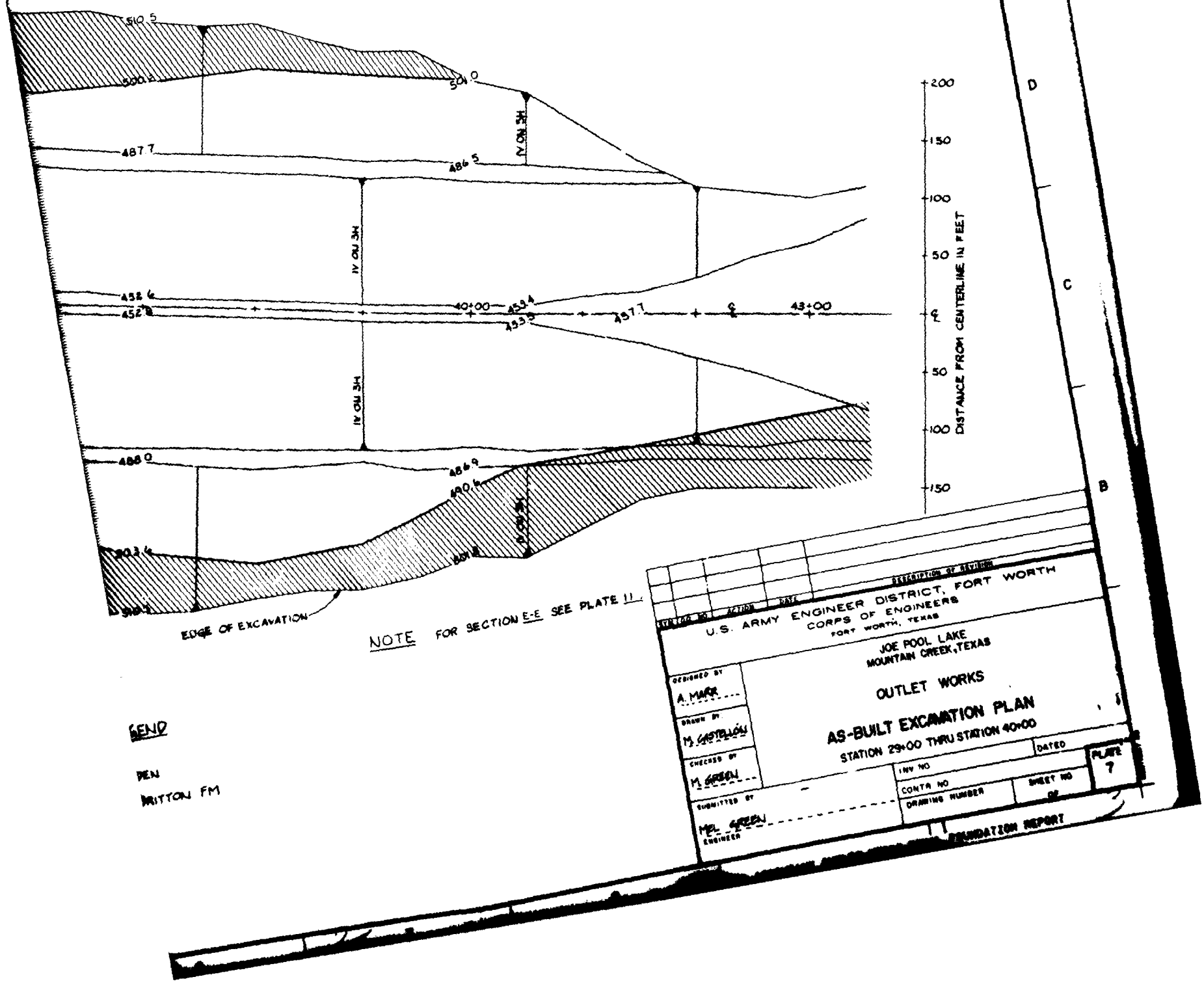
DRAWN BY M. CASTELLON

CHECKED BY M. GREEN

SUBMITTED BY MEL GREEN ENGINEER

AS-BUIL

STATION



NOTE FOR SECTION E-E SEE PLATE II

LEGEND

DEN

BRITTON FM

DESCRIPTION OF REVISION			
INITIALS	NO	ACTION	DATE

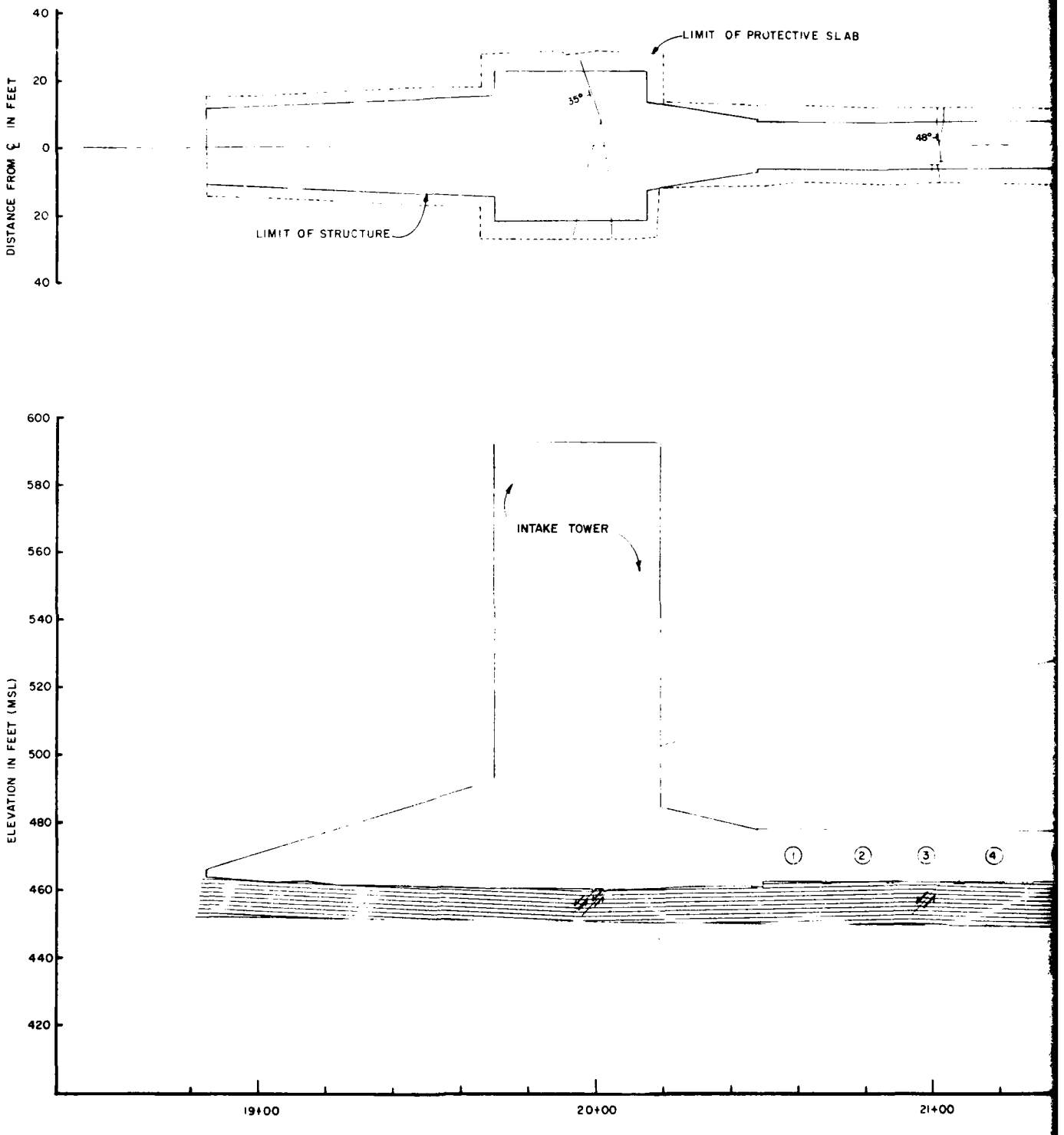
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

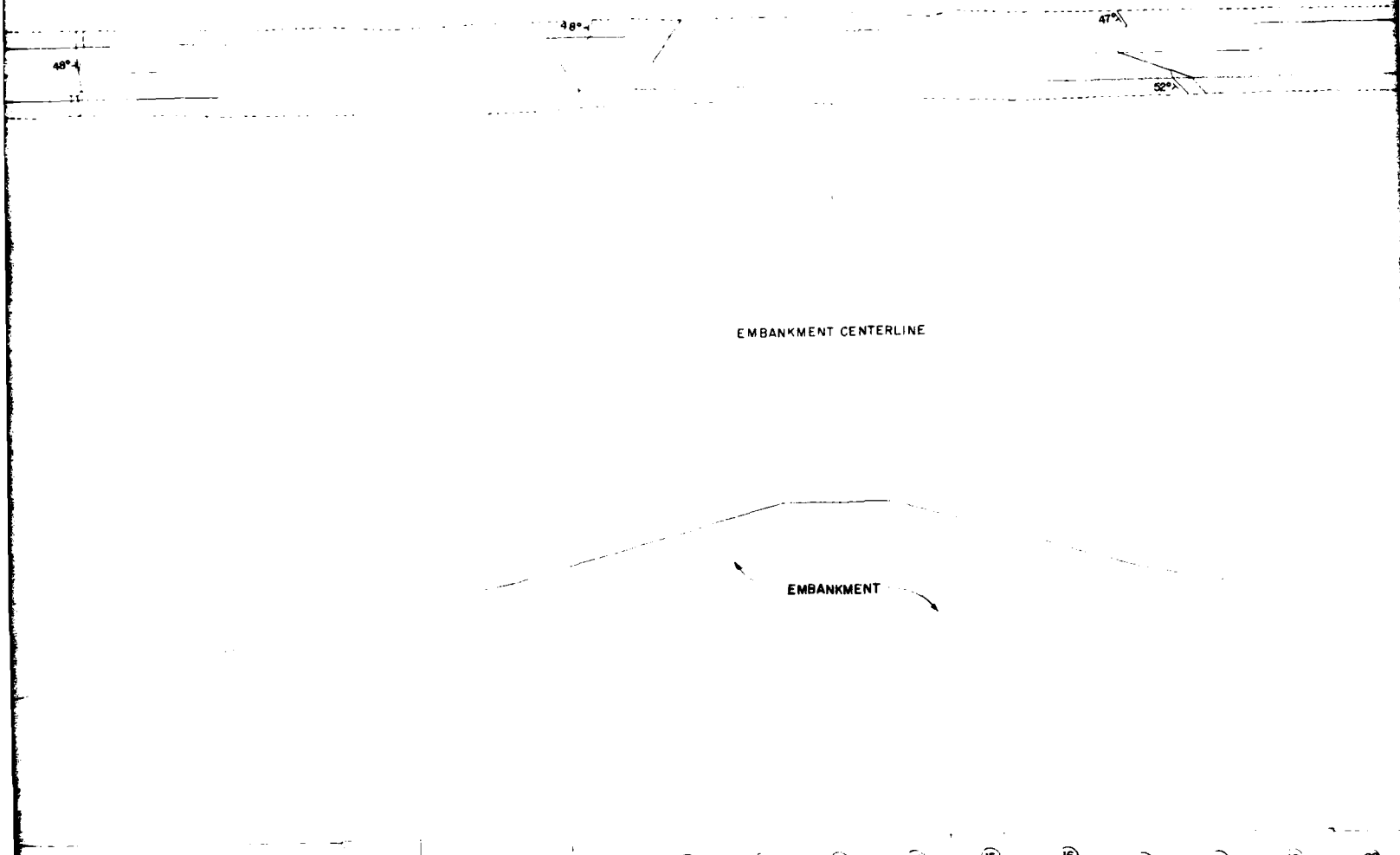
OUTLET WORKS

AS-BUILT EXCAVATION PLAN
STATION 29+00 THRU STATION 40+00

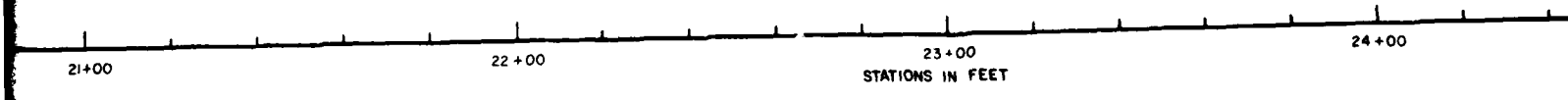
DESIGNED BY A. MAIR	INV NO	DATED	PLATE 7
DRAWN BY M. CASTELLON	CONTR NO	SHEET NO	
CHECKED BY M. GREEN	DRAWING NUMBER	OF	
SUBMITTED BY MEL GREEN, ENGINEER	FOUNDATION REPORT		


40
20
0
20
40
DISTANCE FROM ℄ IN FEET
LIMIT OF PROTECTIVE SLAB
35°
48°
LIMIT OF STRUCTURE
600
580
560
540
520
500
480
460
440
420
ELEVATION IN FEET (MSL)
INTAKE TOWER
1
2
3
4
19+00
20+00
21+00

PLAN VIEW

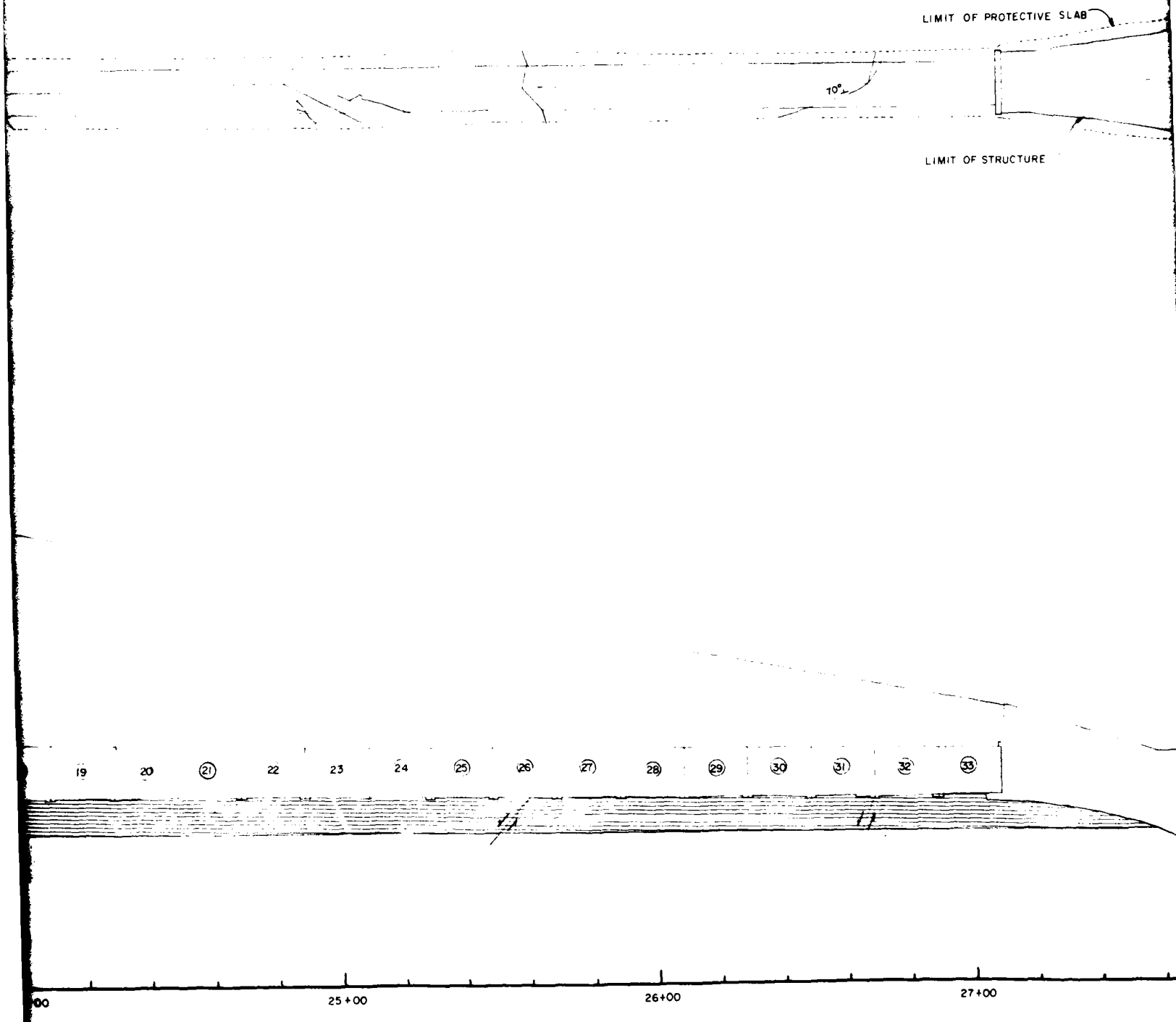


CENTERLINE PROFILE



LEGEND

- UPPER BRITTON FM
- LOWER BRITTON FM
- 65° FAULT OR JOINT EXPOSED ON SURFACE
  U D DIP 45° NE. DOWNTHROWN SIDE ON



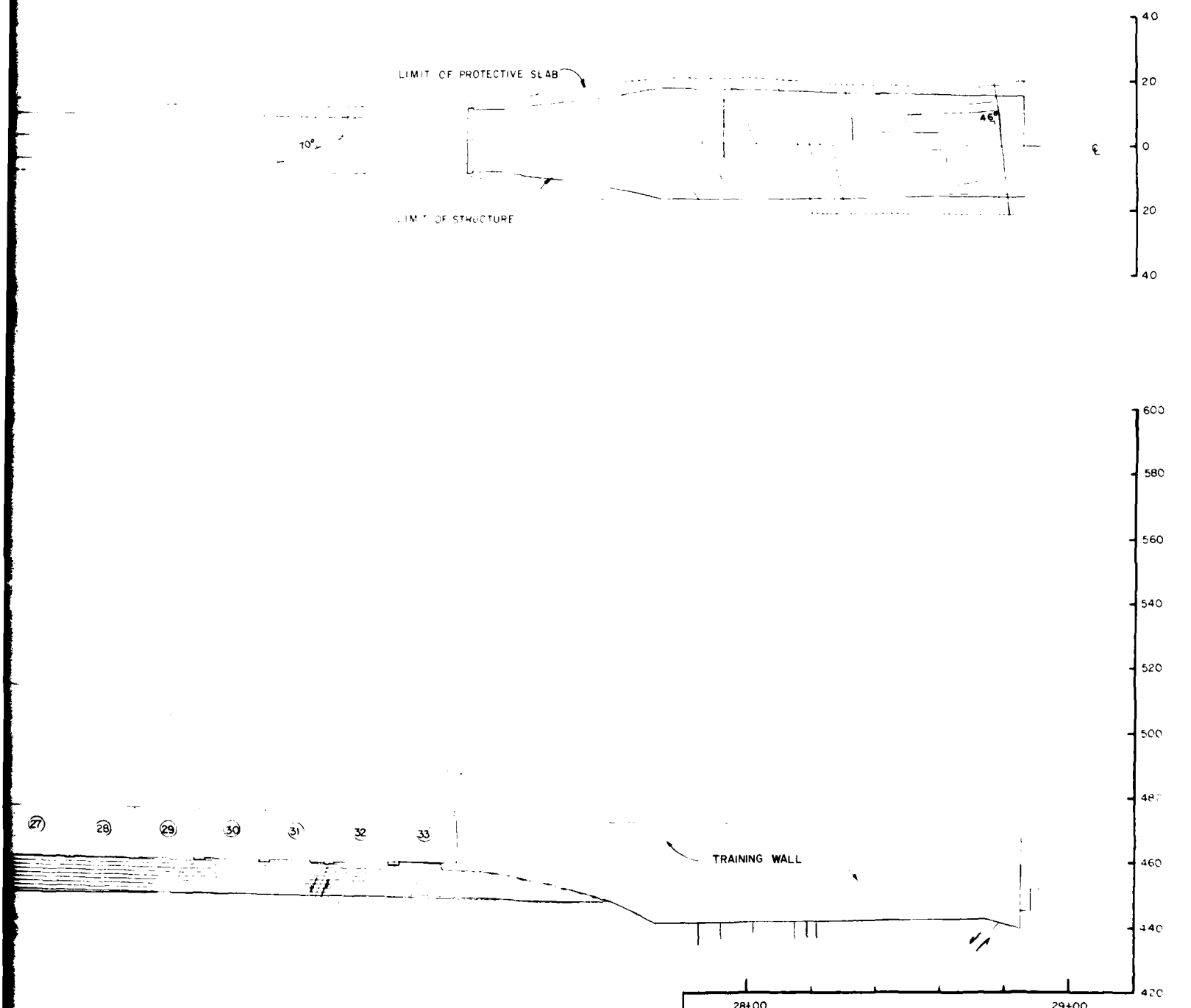
N FM

N FM

EXPOSED ON SURFACE STRIKE NW-SE
UNTHROWN SIDE ON NE SIDE OF FAULT

20' 0 20' 40'

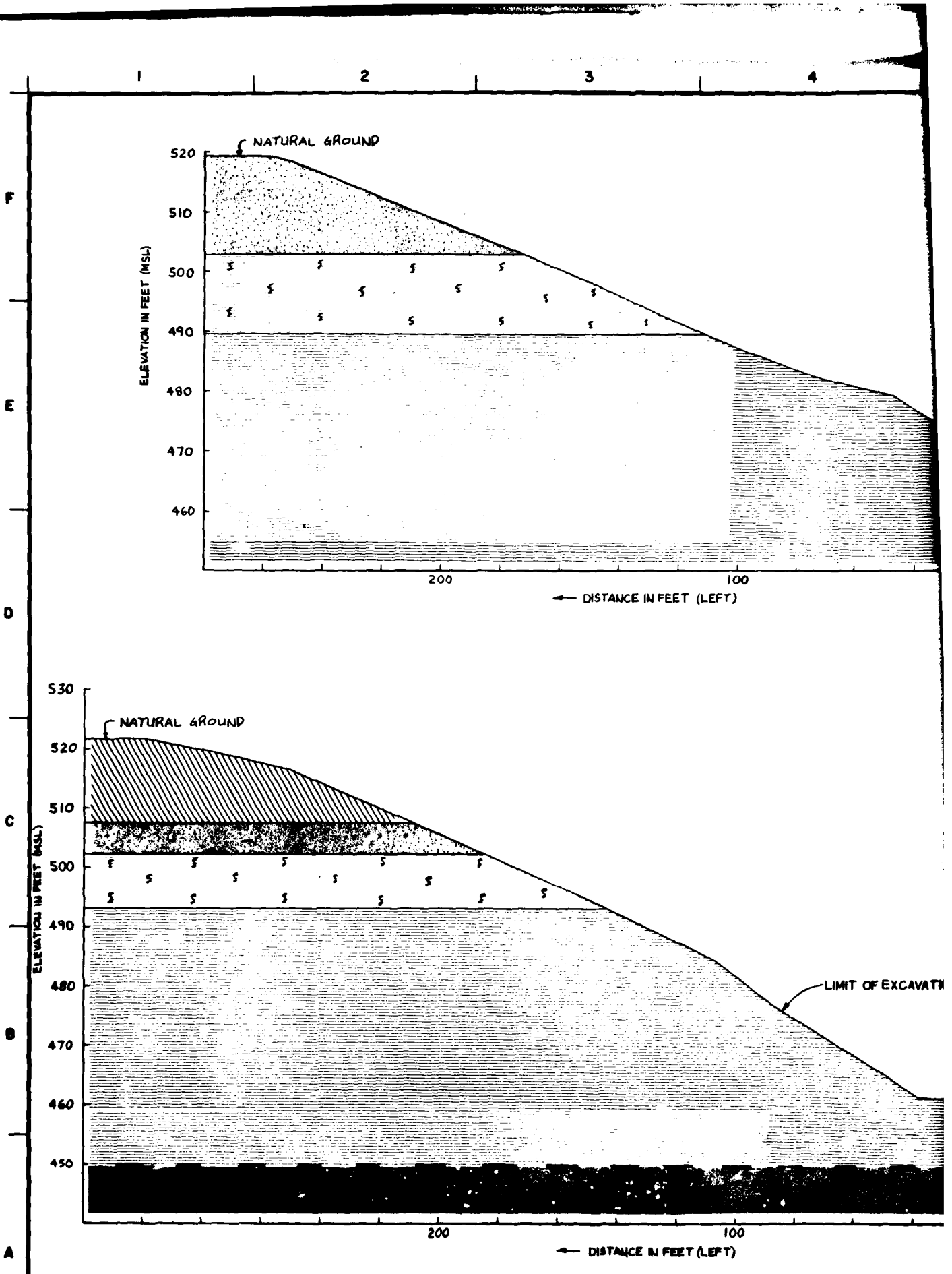
SCALE OF FEET

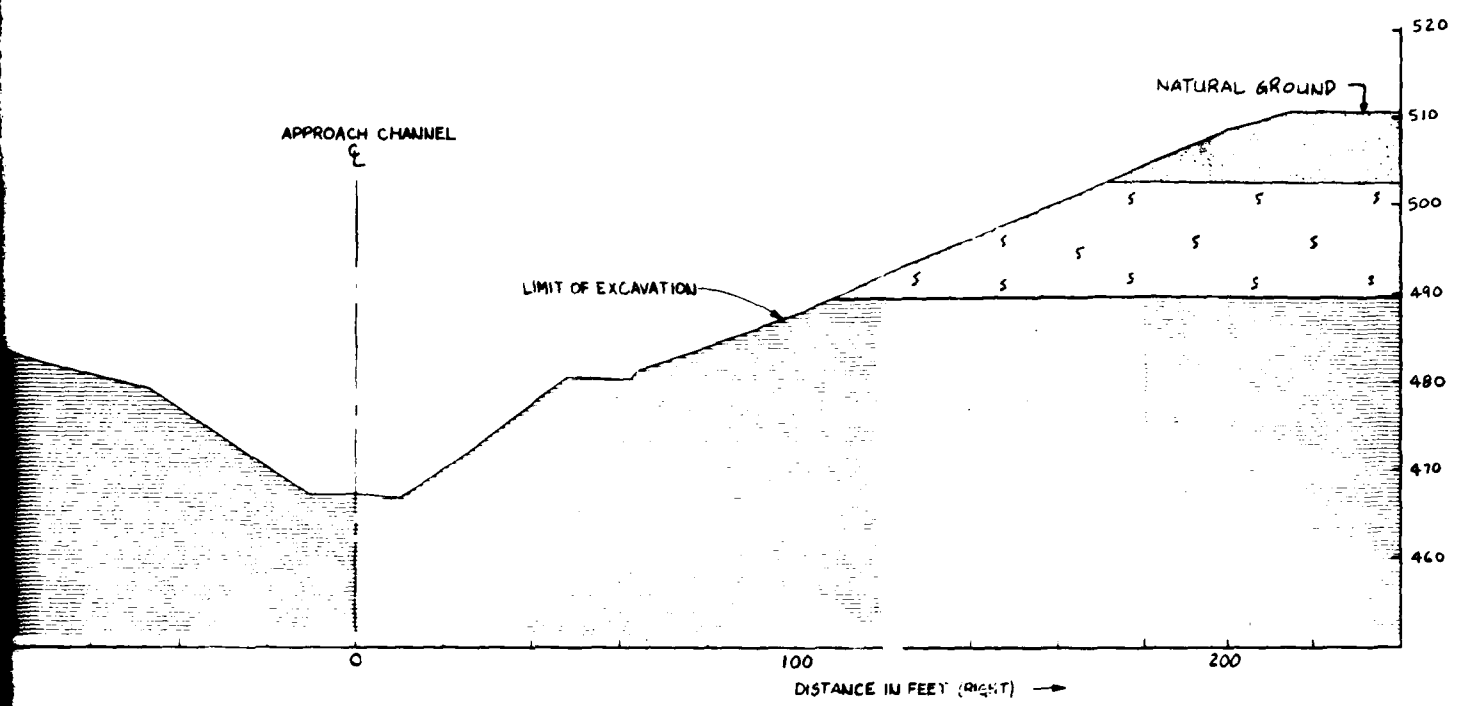


U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

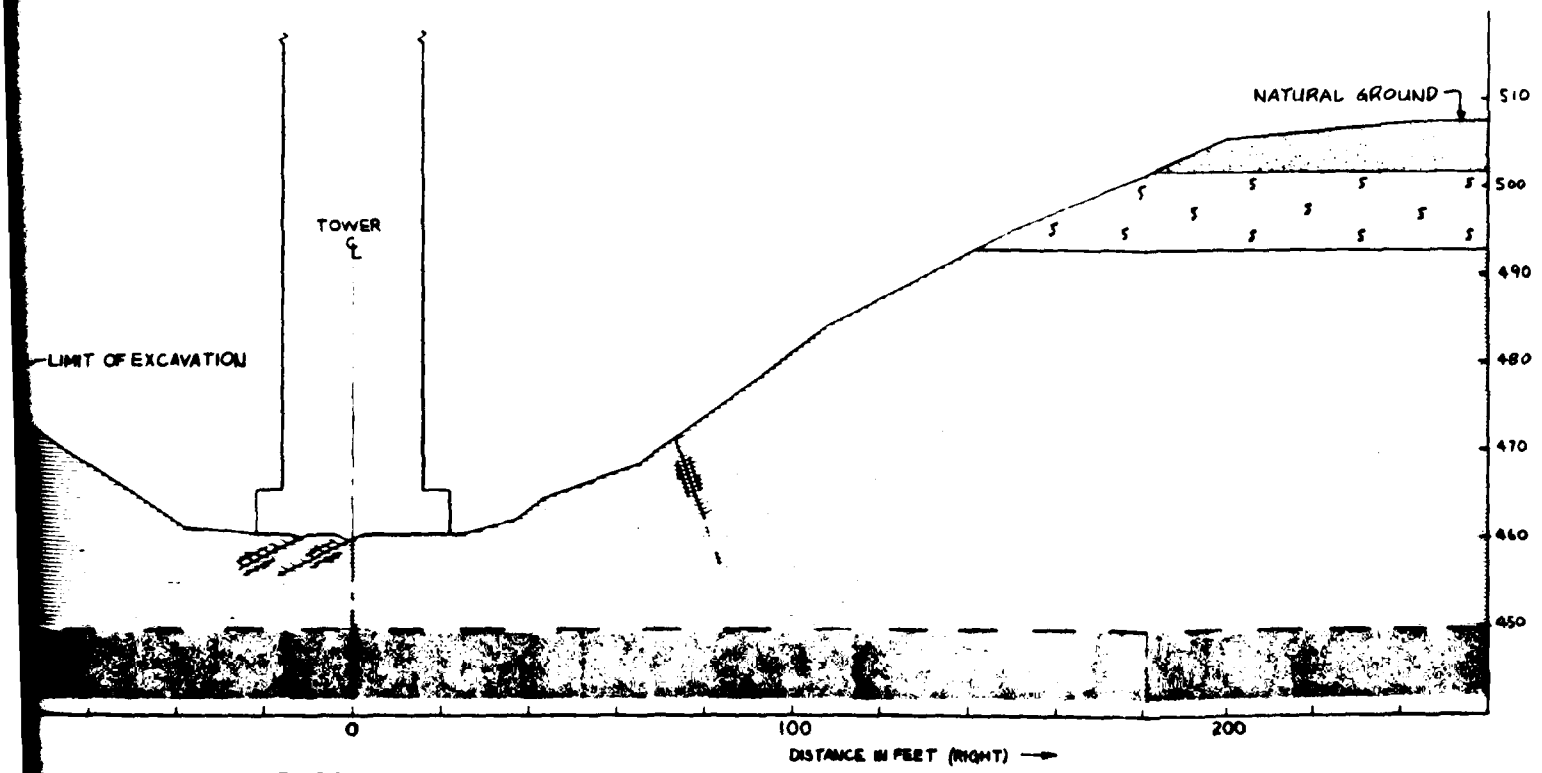
DESIGNED BY: A MARR	JOE POOL LAKE MOUNTAIN CREEK, TEXAS
DRAWN BY: B. SMITH	OUTLET WORKS
CHECKED BY: M. GREEN	STRUCTURE FOUNDATION AS-BUILT PLAN & PROFILE
SUBMITTED BY: MEL GREEN, ENGINEER	INV NO / DATED CONTR NO DRAWING NUMBER / SHEET NO OF PLATE 8

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT

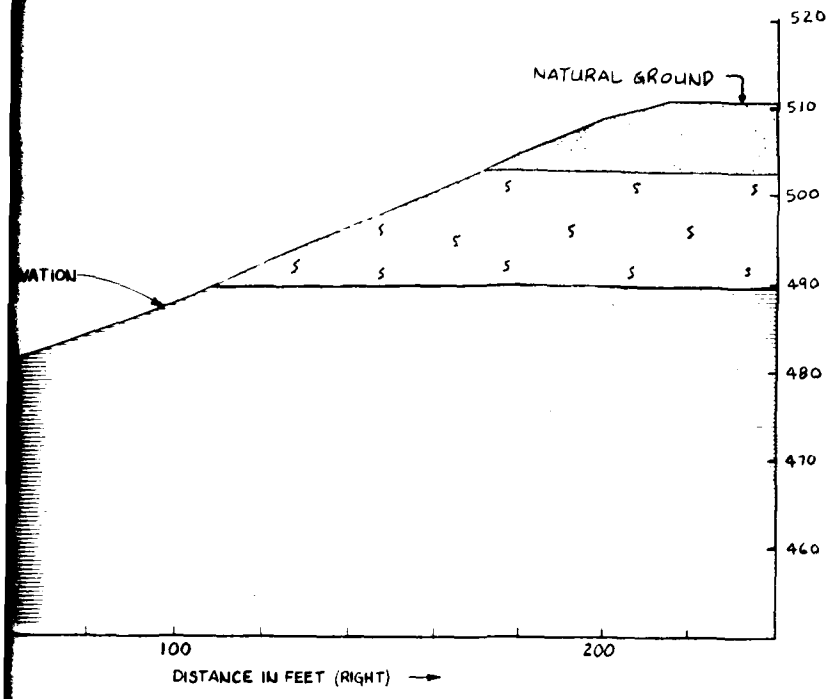

1
2
3
4
F
E
D
C
B
A
NATURAL GROUND
520
510
500
490
480
470
460
ELEVATION IN FEET (MSL.)
200
100
DISTANCE IN FEET (LEFT)
530
NATURAL GROUND
520
510
500
490
480
470
460
450
ELEVATION IN FEET (MSL.)
LIMIT OF EXCAVATI
200
100
DISTANCE IN FEET (LEFT)
1
2
3
4



SECTION A-A

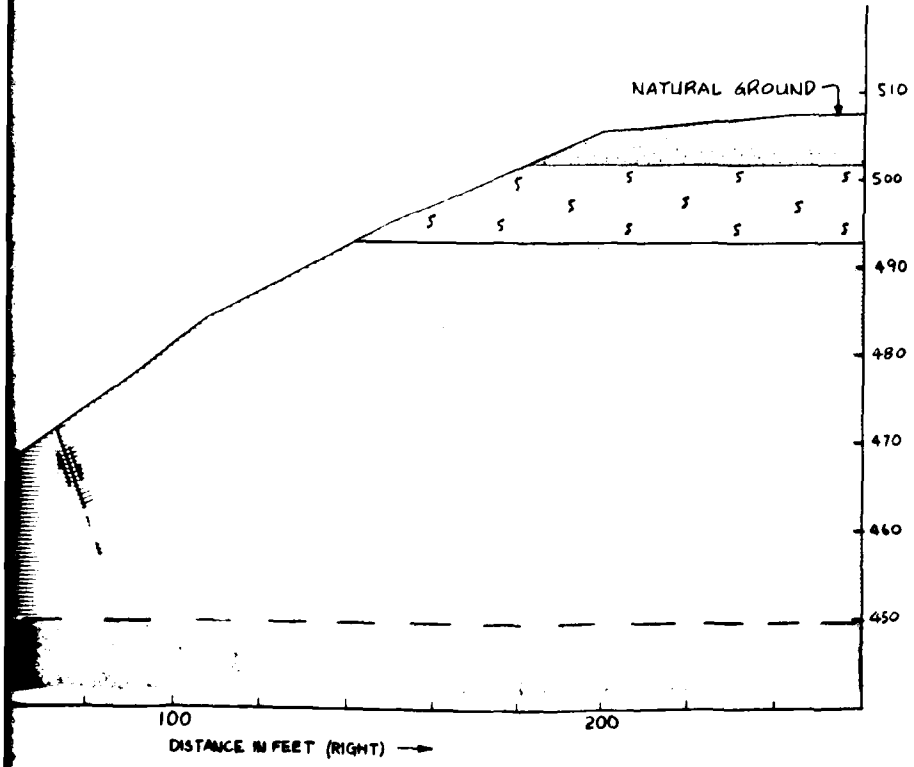


SECTION B-B



LEGEND

- CLAY
- SAND AND GRAVEL
- UPPER BRITTON FM, WEATHERED
- UPPER BRITTON FM, UNWEATHERED
- LOWER BRITTON FM



NOTES

1. FOR LOCATIONS OF CROSS-SECTIONS SEE PLATES 5 & 6.
2. BOTH SECTIONS LOOKING DOWNSTREAM
3. GEOLOGIC CONTACTS DASHED WHERE ESTIMATED

NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: A. MARR
DRAWN BY: M. CASTILLO
REVIEWED BY: M. GREEN

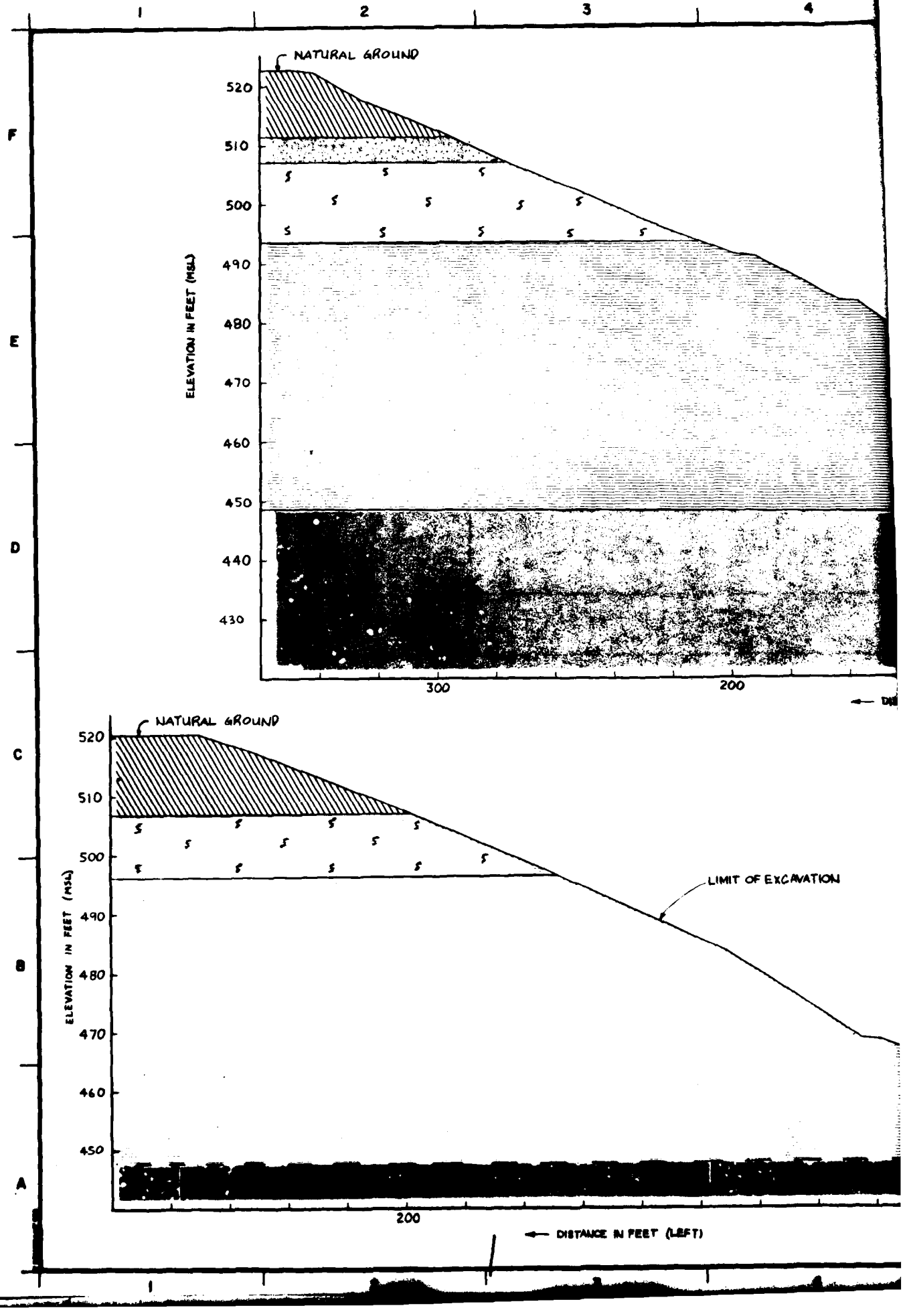
JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

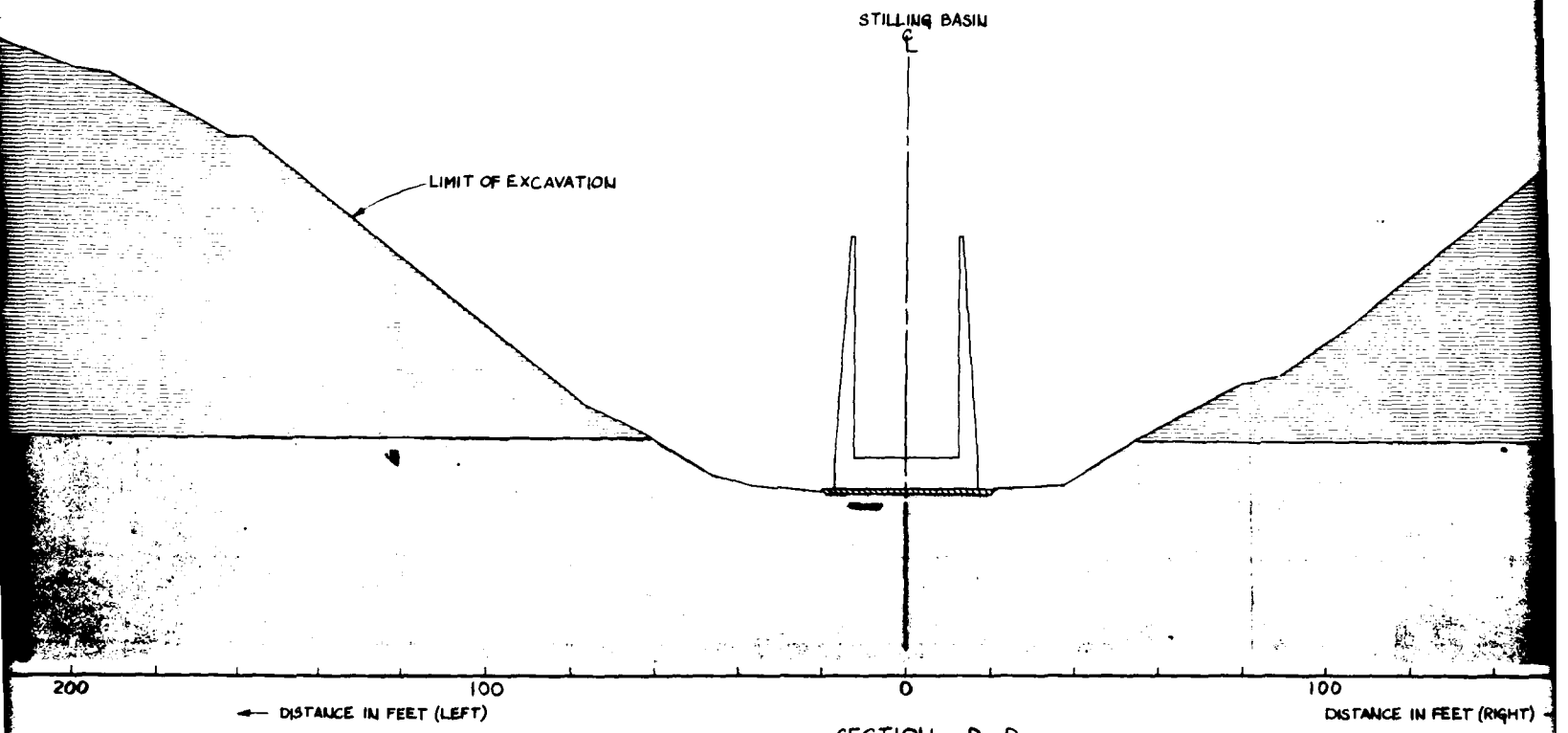
OUTLET WORKS

GEOLOGIC SECTIONS A-A AND B-B

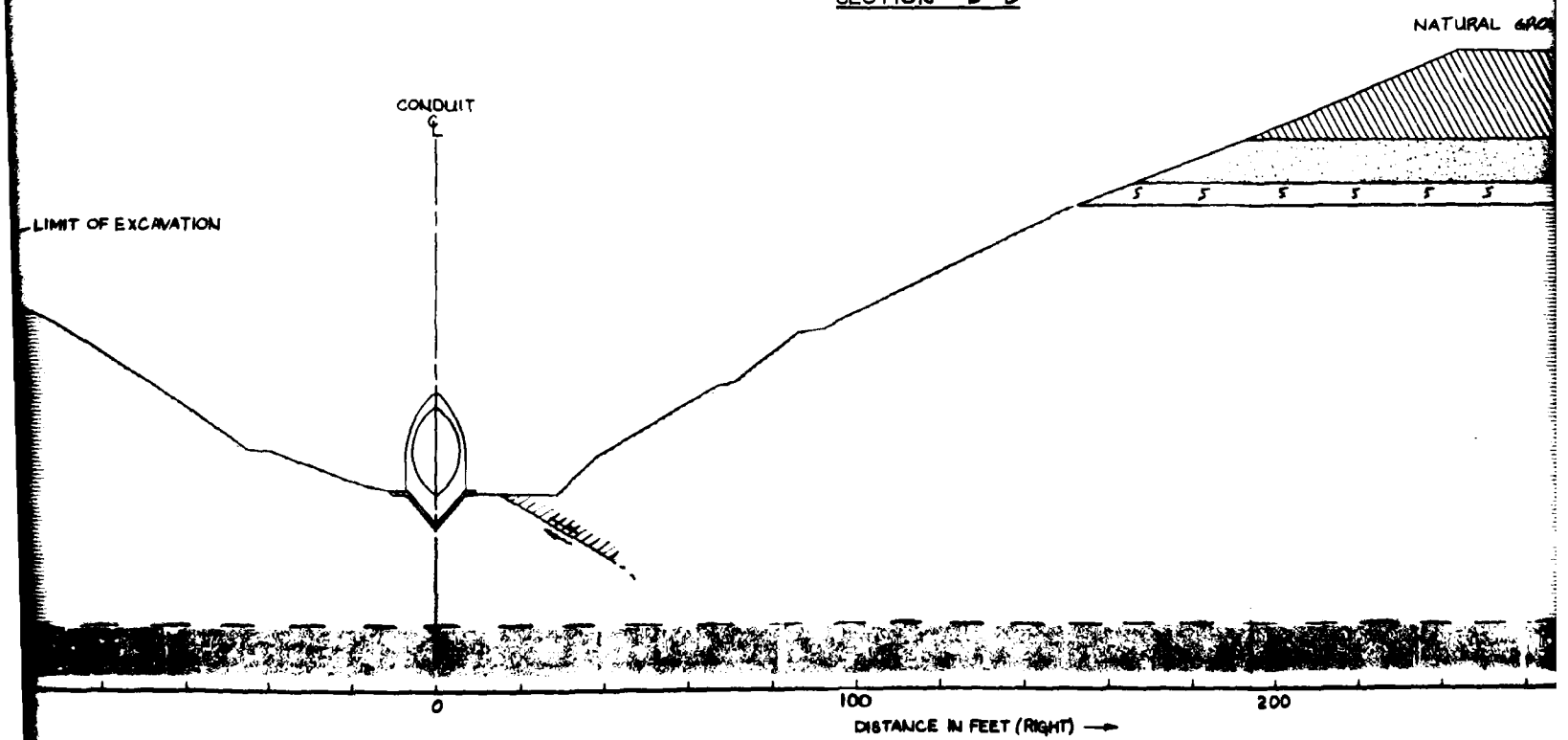
SUBMITTED BY: MEL GREEN
ENGINEER:

INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. OF | PLATE 9

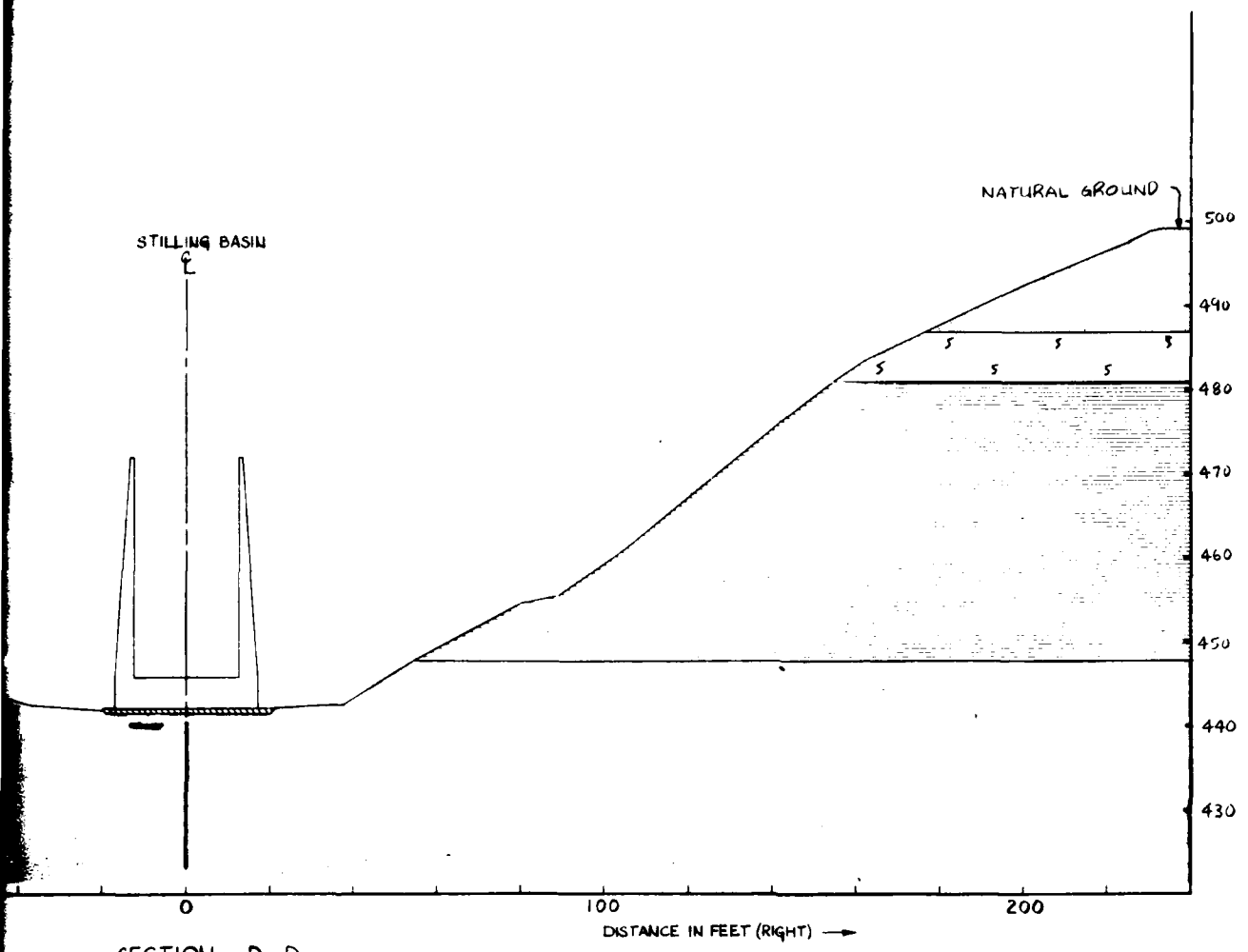

1
2
3
4
F
E
D
C
B
A
NATURAL GROUND
520
510
500
490
480
470
460
450
440
430
ELEVATION IN FEET (MSL)
300
200
NATURAL GROUND
520
510
500
490
480
470
460
450
ELEVATION IN FEET (MSL)
LIMIT OF EXCAVATION
200
DISTANCE IN FEET (LEFT)



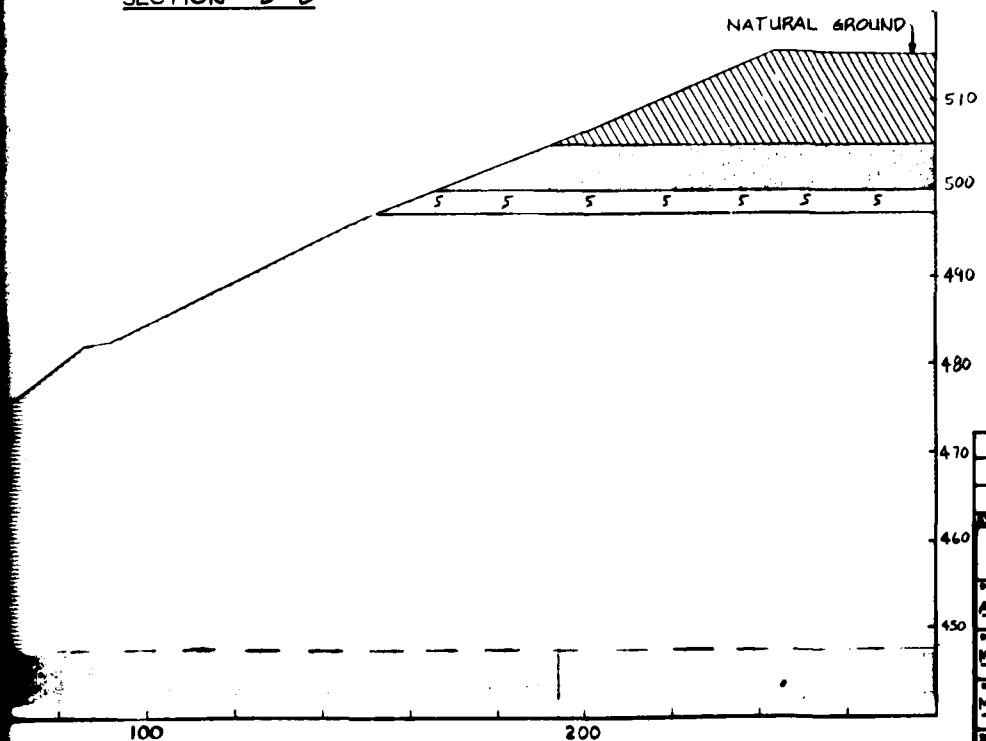
SECTION D-D



SECTION C-C



SECTION D-D



NOTES

1. FOR LOCATIONS OF SECTIONS SEE PLATE 6
2. BOTH SECTIONS LOOKING DOWNSTREAM
3. GEOLOGIC CONTACT DASHED WHERE ESTIMATED

LEGEND

- CLAY
- SAND AND GRAVEL
- S S — UPPER BRITTON FM, WEATHERED
- UPPER BRITTON FM, UNWEATHERED
- LOWER BRITTON FM

NO.	NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: A. MARK
DRAWN BY: M. CASTELLO
REVIEWED BY: M. GREEN
SUBMITTED BY: MEL GREEN
ENGINEER

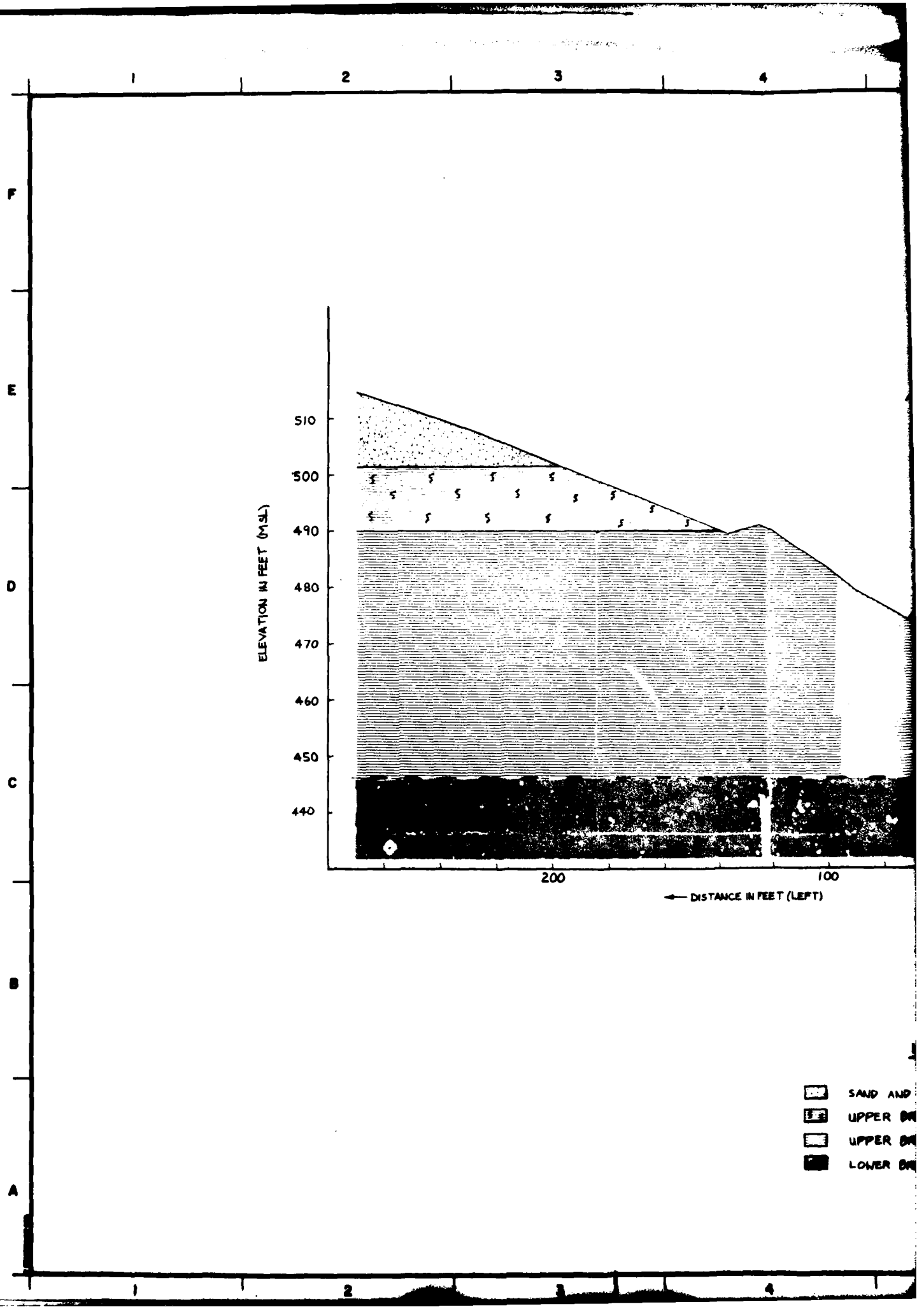
JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

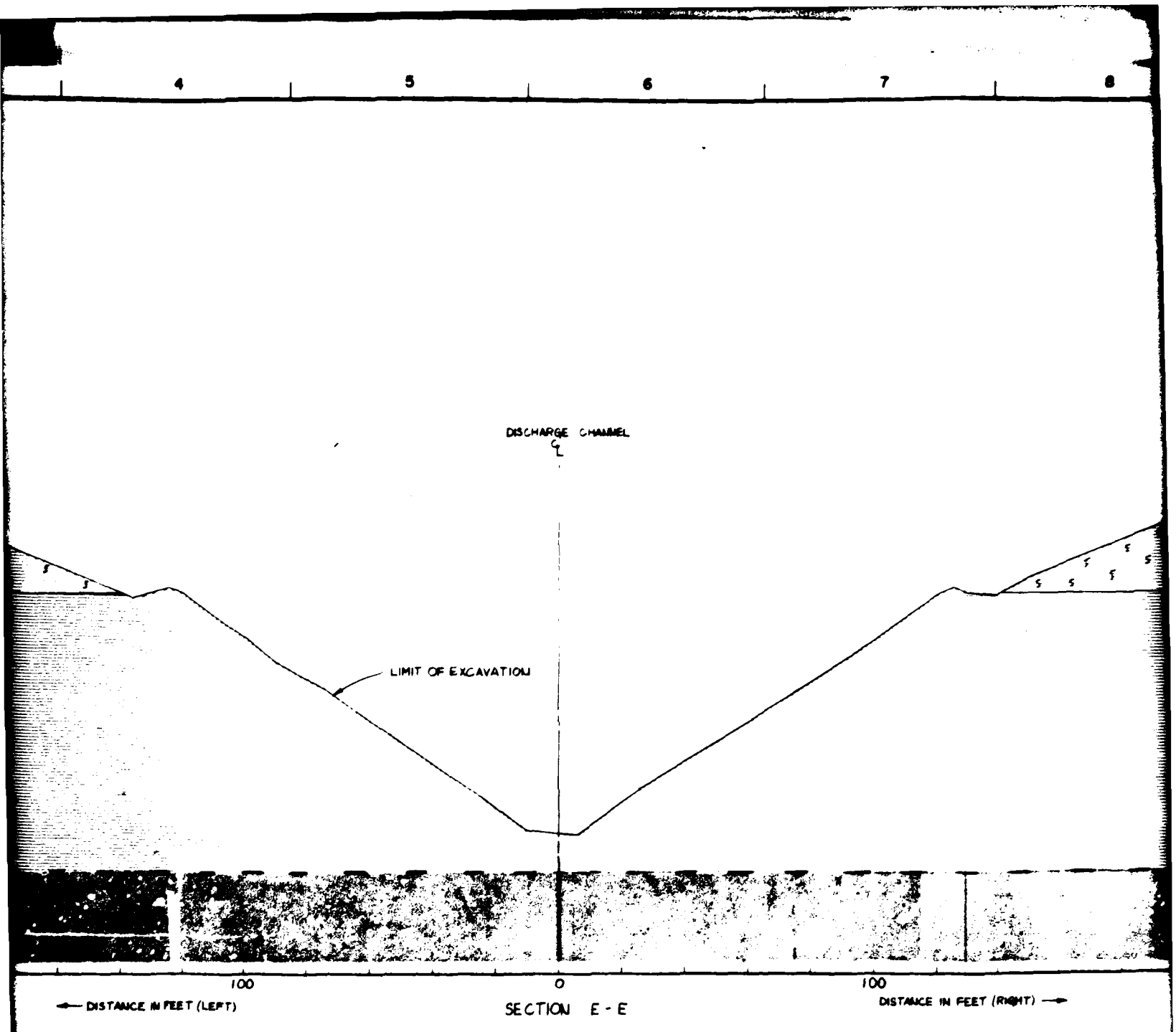
OUTLET WORKS

GEOLOGIC SECTIONS C-C AND D-D

INVITATION NO. | DATE
CONTRACT NO.
IDENTIFYING NUMBER | SHEET NO. OF
PLATE 10

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT


1
2
3
4
F
E
D
C
B
A
ELEVATION IN FEET (MSL)
510
500
490
480
470
460
450
440
200
100
DISTANCE IN FEET (LEFT)
SAND AND
UPPER BR
UPPER BR
LOWER BR



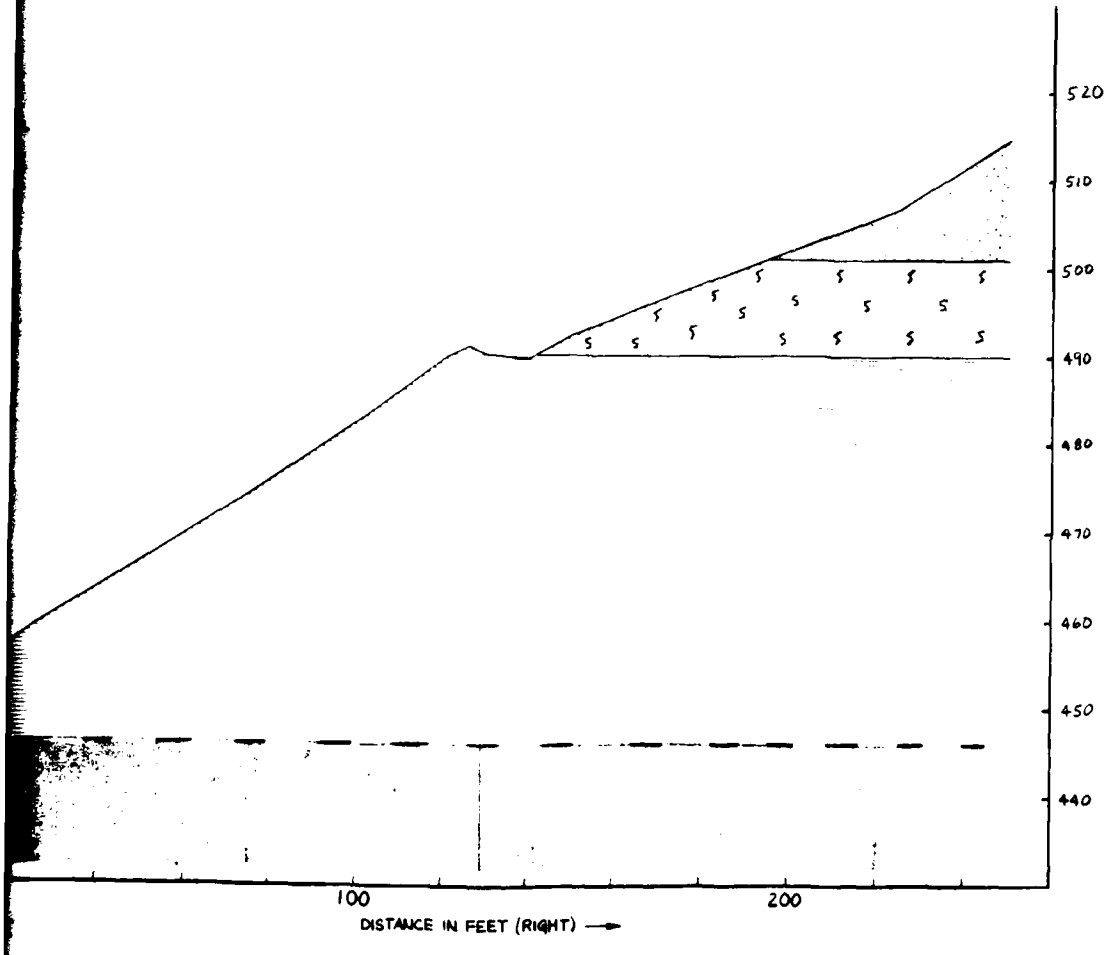
SECTION E - E

NOTES :

1. FOR LOCATION OF SECTION SEE PLATE 1.
2. CROSS SECTION LOOKING DOWNSTREAM
3. GEOLOGIC CONTACT DASHED WHERE ESTIM

LEGEND

- SAND AND GRAVEL
- UPPER BRITTON FM, WEATHERED
- UPPER BRITTON FM, UNWEATHERED
- LOWER BRITTON FM



NOTES :

1. FOR LOCATION OF SECTION SEE PLATE 7.
2. CROSS SECTION LOOKING DOWNSTREAM
3. GEOLOGIC CONTACT DASHED WHERE ESTIMATED

REVISION NO.	ACTION	DATE	DESCRIPTION OF REVISIONS	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: A.NAVAR
DRAWN BY: M.CASTELLÓN
CHECKED BY: M.GREEN

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS
GEOLOGIC SECTION E-E

SUBMITTED BY: MEL GREEN
ENGINEER

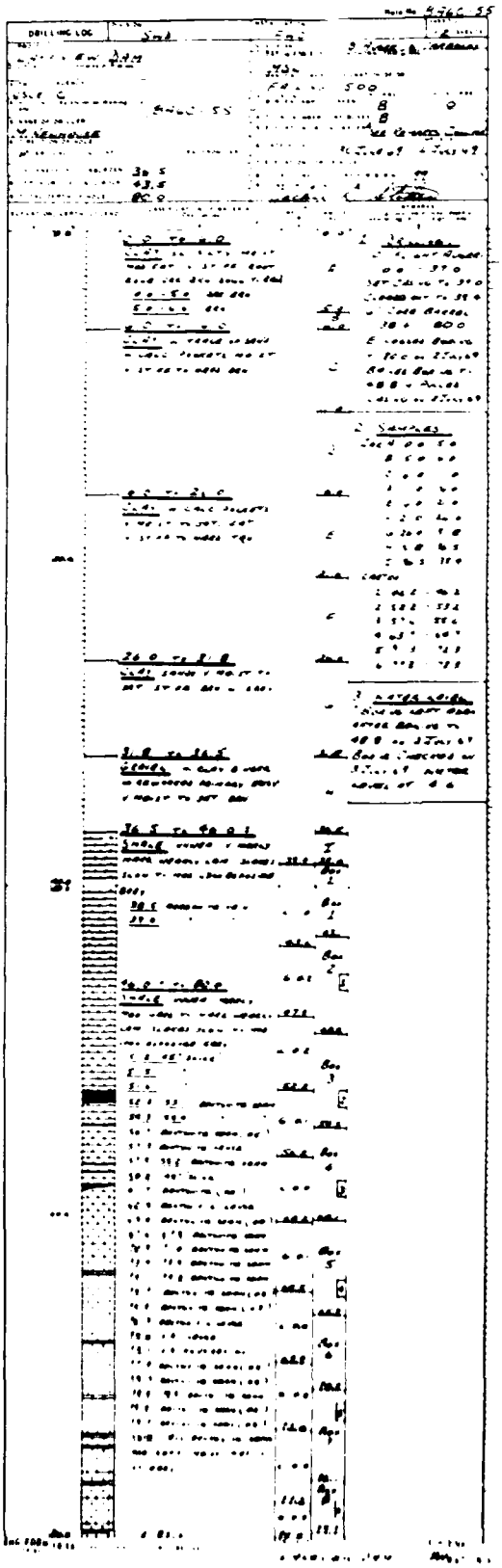
INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. | PLATE 11

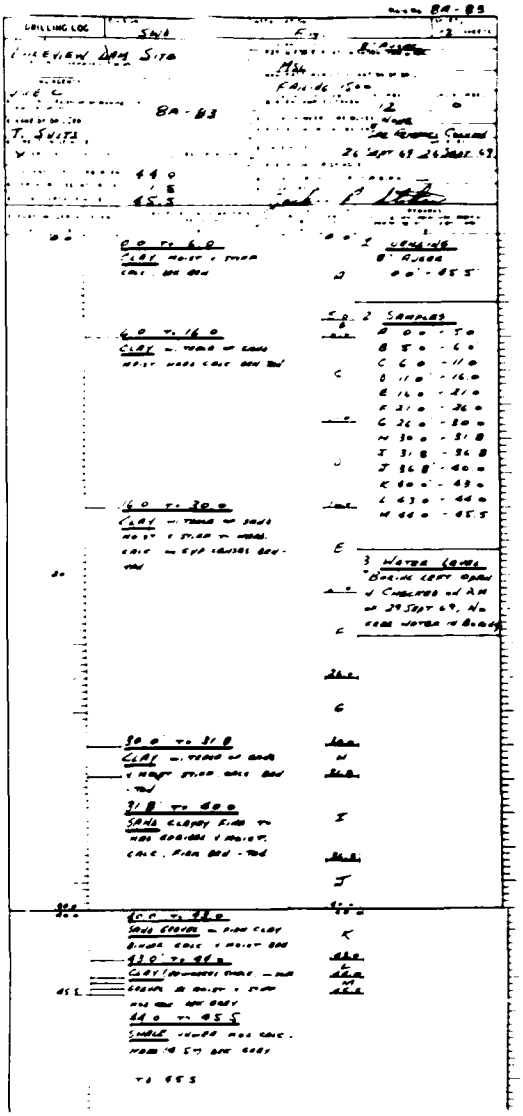
Hole No. 6DC-34

DRILLING LOG — Division: SOUTHWESTERN — Installation: FORT WORTH DIST. — Sheet 1 of 1 sheets

1. Project	LAKEVIEW DAM SITE
2. Location (Coordinates or Station)	X-2,159,088 Y-355,670
3. Drilling Agency	USCE-C
4. Hole No.	6DC-34
5. Name of Driller	SCHOONOVER & CLARK
6. Direction of Hole	Vertical
7. Thickness of Overburden	44.8
8. Depth Drilled into Rock	35.3
9. Total Depth of Hole	80.1
10. Size and Type of Bit	10" AUGER, 6" DENISON, 6" CORE
11. Datum for Elevation Shown (TBM or MSL)	MSL
12. Manufacturer's Designation of Drill	FAILING 1500
13. Total No. of Overburden Samples Taken	Disturbed 24, Undisturbed 23
14. Total Number Core Boxes	6
15. Elevation Ground Water	***
16. Date Hole	Started 26 JUNE 1969, Completed 8 JULY 1969
17. Elevation Top of Hole	477.8
18. Total Core Recovery for Boring	97+ %
19. Signature of Inspector	Charles M. Heil

Depth	Classification of Materials (Description)	% Core Recovery	Box or Sample No.	Remarks
0	**0.0-2.8** CLAY, SL SD, FEW RTS, CALC, SL MST, STF, LT BRN.		A	**DRILLING & MISC.:** 10" AUGER TO 2.0; SET 8" CASING TO 2.0; 6" DENISON 2.0 TO 14.6; HOLE "PINCHED-IN" OVER LONG WEEKEND; PULLED CASING; 10" AUGER (CLEAN-OUT) TO 15.0; SET 8" CASING TO 14.8; 6" DENISON 15.0 TO 30.0; LOST DRILL FLUID CIRC. AT 30.0 (POSSIBLY INTO CRACK IN SOIL); PULLED CASING; 10" AUGER (CLEAN-OUT) TO 31.0; SET 8" CASING TO 31.0; CIRCULATION RETURN; 6" DENISON 31.0 TO 45.3; PULLED CASING; 10" AUGER (CLEAN-OUT) TO 45.5; SET 8" CASING TO 45.5; 6" AUGER (CLEAN-OUT) TO 46.5; 6" CORE 46.5-80.1; BAILED HOLE TO 58.0 & PULLED CASING ON 8 JULY 1969
	2.8-6.0 CLAY, TR SD, CALC, SL GYP & TR GR AT 4.5-6.0, MST, V STF, BRN.		DS #1, B, DS #2, C	
5	**6.0-8.0** CLAY, TR SD & GR, CALC, SL GYP, MST, V STF, LT OLIVE BRN.		DS #3, D	
	8.0-16.0 CLAY, SL TO MOD GR, SL SD, CALC, SL GYP, MST TO V MST, V STF, LT BRN TO TAN & LT BRN W/ LT GREY STRKS.		DS #4, E, DS #5, F, DS #6, G, DS #7, H, DS #8	*** BAILED HOLE TO 58.0 ON 8 JULY 1969
15	**16.0-24.0** CLAY, TR SD, CALC, MST, V STF, TAN W/ LT GREY STRKS TO TAN & LT BRN		I, DS #9, J, DS #10	**NOTE:** ALL DEPTHS ABOVE 45.3 IN COL. "B" AND COL. "G" ARE APPROXIMATE.
20			DS #10, K, DS #11, L, DS #12	**JAR SAMPLES:** A 0.0-2.0; B 3.5; C 5.5; D 7.5; E 9.0; F 10.8; G 12.8; H 14.6; I 17.0; J 19.0; K 21.0; L 23.0; M 25.0; N 27.0; O 29.0; P 30.0; Q 30.0-31.0; R 31.8-32.3; S 34.2; T 36.2; U 38.2; V 40.0; W 42.0; X 44.0; Y 45.3-46.5
25	**24.0-30.0** CLAY, SL SD, CALC, SL GYP, MST, V STF, LT BRN & TAN TO LT BRN, GREY & YL TAN		M, DS #13, N, DS #14, O, DS #15	
30	**30.0-32.5** CLAY, SL SD, TR GR, CALC, SL GYP, V MST, V STF, BRN & GREY W/ LT YL BRN STRKS		P, Q, DS #16, R	
	32.5-37.0 CLAY, SL SANDY TO SANDY, W/ FEW V THIN LENSES OF CLAYEY SAND, CALC, MST TO V MST, V STF; TAN, LT GREY & YL TAN TO YL TAN & LT GREY		DS #17, S, DS #18	**CARTON SAMPLES:** 1 47.4-48.3; 2 53.3-54.2; 3 59.0-59.9; 4 64.8-65.8; 5 70.7-71.6; 6 75.0-75.9; 7 78.4-79.3
35	**37.0-41.5** CLAY, V SANDY, SILTY, W/ THIN LENSES OF CLAYEY SAND, CALC, MST TO V MST, V STF; LT GREY, TAN & YL TAN		T, DS #19, U, DS #20, V	
40	**41.5-43.0** GRAVEL, V CLAYEY, SANDY, CALC, V MST, V STF, LT BRN & GREY		DS #21, W, DS #22	
	43.0-44.8 SAND, CLAYEY, GRAVELLY, CALC, V MST TO WET, V STF, BRN & GREY		X, DS #23	
45	**44.8-52.0** SHALE, MOD CALC DECR TO SL TO MOD CALC, UNWEA, SOFT (NEAR MOD HARD), WEAKLY LAM, DK GREY. 46.5-46.9 FEW, SCTD, MOD HARD TO HARD CLS NODULES; 47.0 HARD CLS SEAM (0.05); 49.3 HARD CLS SEAM (0.05); 51.3 MOD HARD, V CALC SEAM (0.02 TO 0.06); 51.8 HARD CLS SEAM (0.04)	46.5: 100; 48.8; 100	Y, BOX #1	**NOTE:** BEDDING PLANES OF PRIMARY MTL (SHALE) DIP < 5°
50				
	52.0-64.0 SHALE, SL CALC TO CALC, UNWEA, SOFT (NEAR MOD HARD), WEAKLY LAM, DK GREY. 56.0-64.0 SCTD, MOD HARD, V CALC (NEAR MARLY) SEAMS, 0.01 TO 0.10 THICK; INCR IN # W/ DEPTH, DK BRN GREY	99.3; 100	BOX #2	
55				
60		100.1	BOX #3	
65	**64.0-67.1** SHALE, SL CALC TO CALC, UNWEA, SOFT TO MOD HARD, WEAKLY LAM, GREY TO DK GREY. 64.0-66.1 SCTD, MOD HARD TO HARD MARLY SEAMS, 0.02 TO 0.07 THICK, DECR IN # W/ DEPTH, DK BRN GREY; 65.9-66.1 MOD BENTONITIC; 66.5 MOD HARD MARLY SEAM	100	BOX #4	
	67.1-69.7 SHALE, UNWEA, WEAKLY LAM. 67.1-67.7 MARLY, MOD HARD (NEAR HARD) & DK BRN GREY; 67.7-68.3 MOD CALC TO CALC, SOFT (NEAR MOD HARD) TO MOD HARD & GREY TO DK GREY; 68.3-68.8 MARLY, MOD HARD (NEAR HARD) & DK BRN GREY; 68.8-69.7 MOD CALC TO CALC, MOD HARD DECR TO SOFT & DK GREY TO GREY	98.6		
70	**69.7-79.3** SHALE, MARLY, MOD HARD (NEAR HARD), WEAKLY LAM, UNWEA, DK BRN GREY. 70.1 BENTONITIC SEAM (0.02); 70.6 IMPURE BENTONITE SEAM (0.04 TO 0.08 THICK) W/ SCTD PYRITE XLS; BROKEN BY CORING ACTION, HARD (SOIL CLASSIF)	100	BOX #5	
75		100	BOX #6	
80	**79.3-80.1** NO RECOVERY - CORE LEFT IN HOLE			





NOTE

SEE SEC __ AND __ FOR BORING LOCATIONS

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS AND INITIAL EMBANKMENTS

LOGS OF BORINGS
6DC-54, 8A&C-55 AND 8A-63

DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
RECOMMENDED

REV NO
DATED
DRAWING NUMBER
SHEET NO

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 18

Hole No. BA-84

DRILLING LOG	DIVISION: SOUTHWESTERN	INSTALLATION: FORT WORTH DIST	SHEET 1 OF 3 SHEETS

1. PROJECT: LAKEVIEW DAM SITE	10. SIZE AND TYPE OF BIT: 8" AUGER
2. LOCATION (Coordinates or Station): **	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: USCE-C	12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500
4. HOLE NO. (As shown on drawing title and file number): BA-84	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 16, UNDISTURBED NONE
5. NAME OF DRILLER: TANNER	14. TOTAL NUMBER CORE BOXES: NONE
6. DIRECTION OF HOLE: ✓ VERTICAL ☐ INCLINED ___ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ***
	16. DATE HOLE: STARTED 26 SEPT 1969, COMPLETED 26 SEPT 1969
	17. ELEVATION TOP OF HOLE: **
7. THICKNESS OF OVERBURDEN: 46.6	18. TOTAL CORE RECOVERY FOR BORING: — %
8. DEPTH DRILLED INTO ROCK: 3.2	19. SIGNATURE OF INSPECTOR: Charles M. Heil
9. TOTAL DEPTH OF HOLE: 49.8	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		**0.0-2.5** CLAY, SL SD, W/ ROOTS, V CALC, MST, V STF, LT BRN		A	**JAR SAMPLES:** A 0.0-2.5; B 2.5-7.0; C 7.0-12.0; D 12.0-17.0; E 17.0-22.0; F 22.0-26.5; G 26.5-29.0; H 29.0-30.5; I 30.5-35.5; J 35.5-38.0; K 38.0-39.0; L 39.0-44.5; M 44.5-45.5; N 45.5-46.0; O 46.0-46.6; P 46.6-49.8
	2.5		**2.5-7.0** CLAY, TR TO SL SD & GR, CALC, SL GYP, MST, V STF, BRN TO BRN & LT BRN. **2.5-4.0** FEW V THIN GRAVELLY LENSES		B	
	7.0		**7.0-29.0** CLAY, TR SD, CALC, MST, V. STF, LT BRN TO LT BRN & BRN. **7.0-12.0** TR GR, SL GYP		C	** HOLE OFFSET 16' EAST OF AND AT APPROX SAME ELEV AS SURVEYED LOCATION.
	12.0				D	*** HOLE OPEN & DRY AFTER 4 DAYS
	17.0				E	
	22.0				F	
	26.5				G	
	29.0		**29.0-30.5** CLAY, SL TO MOD SD, V CALC, MOD GYP, MST, V STF, LT BRN & TAN W/ WHITE STRKS		H	
	30.5		**30.5-38.0** CLAY, SILTY, MOD SANDY, V CALC, MST, V. STF, LT BRN & TAN		I	
	35.5				J	
	38.0		**38.0-39.0** CLAY, TR SD & GR, CALC, V MST, V STF, GREY & RD TO VL BRN		K	
	39.0		**39.0-44.5** CLAY, TR SD INCR TO SL TO MOD SD, CALC, SL GYP, MST TO V MST, V STF, LT GREY W/ RD BRN STRKS		L	
	44.5		**44.5-45.5** GRAVEL, CLAYEY, SANDY, MAX SIZE REC. 1", V CALC, V MST, V STF, BRN & GREY		M	
	45.5		**45.5-46.0** CLAY, MOD SD & GR, V CALC, V MST, STF; GREY, TAN & LT BRN.		N	
	46.0		**46.0-46.6** CLAY, GRAVELLY, SANDY, V CALC, WET, STF, BRN		O	
	46.6		**46.6-49.8** SHALE, MOD CALC TO CALC, SL WEA DECR TO UNWEA, SOFT (NEAR MOD HARD), DK GREY W/ FEW RD TO VL TAN STRKS TO DK GREY		P	
	49.8					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT: LAKEVIEW D.S. HOLE NO. BA-84

LAKEVIEW D.S. — 8A 84

DRILLING LOG — Hole No. 6D-85

Lakeview Dam Site — SWD — FWD

Drilling agency: USCE — Hole designation: 6D-85 — Name of driller: T. Smith

Size and type of bit: 8" Auger — Type of drill: Failing 1500 — Total samples: 21 — 21 — Overburden: None — Elevation ground water: See Remarks Column

Date hole: 24 Sept 69 – 25 Sept 69

Thickness of overburden: 40.5 — Depth drilled into rock: 0.0 — Total depth of hole: 40.5

- 0.0 to 4.0 ± — CLAY, moist, stiff, calc., root zone, brn
- 4.0 ± to 7.5 ± — CLAY, moist, hard, calc., mod. fat, gray-brn
- 7.5 ± to 11.5 ± — CLAY, moist, hard, calc., mod. fat, brn-tan
- 11.5 ± to 13.5 ± — CLAY w/ abund. calc. gravel, moist, stiff, firm, brn
- 13.5 ± to 18.5 ± — CLAY, moist, hard, calc., w/ gyp, mod. fat, brn-tan
- 18.5 ± to 28.0 ± — CLAY w/ trace of sand, moist to v. moist, calc., w/ gyp pockets, mod. fat, hard, brn-tan
- 28.0 ± to 31.5 ± — CLAY w/ trace of sand, v. moist to sat., w/ gyp pockets, calc., mod. fat, v. stiff, tan w/ gray
- 31.5 ± to 37.0 ± — SAND, clayey, fine to med. grained, sat., firm, calc., tan w/ gray
- 37.0 ± to 40.5 — GRAVEL, fine to med., w/ sand & clay binder, sat., med. firm, calc., brn
- 40.5 — SHALE, unwea., sl. moist, hard (4.5 ±) mod. calc., dk. gray, to 60.5

Remarks:

1. Drilling: 8" Auger 0.0 – 3.5; 6" Denison 3.5 – 40.5
2. Samples: A 0.0 – 3.5; "B" thru "U" taken from Denison samp.: 1 3.5 – 5.0; 2 5.0 – 6.5; 3 6.5 – 8.5; 4 8.5 – 10.5; 5 10.5 – 12.5; 6 12.5 – 14.5; 7 14.5 – 16.0; 8 16.0 – 17.5; 9 17.5 – 18.7; 10 18.7 – 20.3; 11 20.3 – 22.3; 12 22.3 – 23.9; 13 23.9 – 25.5; 14 25.5 – 27.0; 15 27.0 – 28.5; 16 28.5 – 30.5; 17 30.5 – 32.5; 18 32.5 – 34.5; 19 34.5 – 36.0; 20 36.0 – 38.0; 21 38.0 – 40.0. Note: Jar sample U taken from 40.0 – 40.5
3. Water Level: Boring bailed to 32.0 on 25 Sept 69, checked on 29 Sept 69, water level at 22.5

ENG FORM 1836 — Lakeview Dam Site — 6D-85

DRILLING LOG — Hole No. 8A-87

Lakeview Dam Site — SWD — FWD

Drilling agency: USCE — Hole designation: 8A-87 — Name of driller: T. Smith

Size and type of bit: 8" Auger — Type of drill: Failing 1500 — Total samples: 11 — Overburden: None — Elevation ground water: See Remarks Column

Date hole: 26 Sept 69 – 26 Sept 69

Thickness of overburden: 38.0 — Depth drilled into rock: 1.0 — Total depth of hole: 39.0

- 0.0 to 7.0 — CLAY, moist & stiff, calc., dk. brn
- 7.0 to 18.0 — CLAY w/ trace of sand, moist, down to v. moist to sat., v. stiff to hard, calc., brn-tan; 7.0 – 9.0 moist; 9.0 – 18.0 v. moist to sat.
- 18.0 to 21.0 — CLAY w/ trace of sand, w/ fine calc. gravel, v. stiff, v. moist to sat., brn-tan
- 21.0 to 30.5 — CLAY, sl. sandy down to sandy, stiff, calc., sat., brn-tan; 21.0 – 26.0 sl. sandy; 26.0 – 30.5 sandy
- 30.5 to 35.5 — SAND, clayey, fine to med., sat., firm, calc., brn-tan
- 35.5 to 37.0 — SAND GRAVEL w/ clay binder, sat., calc., med. firm to firm, brn-tan
- 37.0 to 38.0 — CLAY (or weathered shale) w/ fine gravel, sat., firm, calc., brn-gray
- 38.0 to 39.0 — SHALE, unwea., mod. calc., hard, dk. gray

Remarks:

1. Drilling: 8" Auger 0.0' – 39.0'
2. Samples: A 0.0' – 5.0; B 5.0' – 7.0; C 7.0' – 9.0; D 9.0' – 14.0; E 14.0' – 18.0; F 18.0' – 21.0; G 21.0' – 26.0; H 26.0' – 30.5; I 30.5' – 35.5; J 35.5' – 37.0; K 37.0' – 38.0; L 38.0' – 39.0
3. Water Level: Boring left open & checked on a.m. of 29 Sept 69. Water at 16.7

ENG FORM 1836 — Lakeview Dam Site — 8A 87

SYMBOL	DESCRIPTION OF REVISION	DATE	APPROVAL

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

Designed by: — Drawn by: — Checked by: — Submitted by: — Engineer:

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS AND INITIAL EMBANKMENTS

LOGS OF BORINGS
8A-84, 6D-85 AND 8A-87

INV NO — DATED — DRAWING NUMBER — SHEET NO. — SEQUENCE NO.

TO ACCOMPANY OUTLET WORKS FOUNDATION REPORT — PLATE 13

Hole No. 68-531

DRILLING LOG	DIVISION Southwestern	INSTALLATION Fort Worth District	SHEET 1 OF 2 SHEETS

1. PROJECT	Lakeview Lake
2. LOCATION	
3. DRILLING AGENCY	Corps of Engineers
4. HOLE NO.	68-531
5. NAME OF DRILLER	Brown
6. DIRECTION OF HOLE	☒ VERTICAL ☐ INCLINED ___ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	44.9'
8. DEPTH DRILLED INTO ROCK	2.6'
9. TOTAL DEPTH OF HOLE	47.5'
10. SIZE AND TYPE OF BIT	6" D Bbl and auger
11. DATUM FOR ELEVATION SHOWN	
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	DISTURBED 11 / UNDISTURBED 29
14. TOTAL NUMBER CORE BOXES	2
15. ELEVATION GROUND WATER	*
16. DATE HOLE	STARTED 22 Jan 75 / COMPLETED 24 Jan 75
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING	100%
19. SIGNATURE OF INSPECTOR	[illegible]

ELEVATION | DEPTH | LEGEND | CLASSIFICATION OF MATERIALS (Description) | % CORE RECOVERY | BOX OR SAMPLE NO. | REMARKS

Classification of materials

0.0' to 44.7'

CLAY - -

0.0' to 4.5' medium plasticity, grayish-brown, stiff, very moist, with very small, irregular calcareous nodules

4.5' to 6.0' becomes very stiff to hard, moist

6.0' to 10.0' becomes hard

10.0' to 14.0' low to medium plasticity, brown, hard, moist, slightly sandy

14.0' to 21.0' medium plasticity, brown, hard, moist

21.0' to 26.0' low plasticity, brown, moist, slightly sandy, with white, calcareous streaks; very difficult to denison barrel from 16.0' to 25.5'

26.0' to 30.0' low plasticity, gray and tan mottled, hard, moist, sandy

30.0' to 34.0' becomes very sandy

34.0' to 37.0' becomes very stiff, very moist, slightly sandy

37.0' to 39.0' medium plasticity, brownish-gray, stiff, very moist

39.0' to 43.0' low plasticity, brown-gray, stiff, very moist, very sandy; with saturated clayey sand from 42.0' to 42.6'

43.0' to 44.7' becomes medium stiff

44.7' to 44.9'

GRAVEL - -

tan, saturated, clayey, well rounded, to ½ inch

44.9' to 47.5'

SHALE - -

dark gray, thin-bedded, non-weathered, calcareous, non-fractured, non-jointed

T. D. in shale at 47.5'

Jar A, B; Can 1, 2, 3, 4, 5, 6, 7, 8, 9, 10; 23.5; LO1; 27.5; GO1; 31.5; LOO; 36.5; LO2; 39.5; Box 1; GO1; 43.5; LOO; 2; 47.5

Remarks

Drilling

0.0' to 4.0' 8" auger
4.0' to 23.5' 6" D Bbl
23.5' to 47.5' 6" core
no casing

Jar samples

A. 0.0' to 4.0'
B. 5.0'
C. 7.0'
D. 9.0'
E. 11.0'
F. 13.0'
G. 15.0'
H. 17.0'
I. 18.0'
J. 20.0'
K. 21.7'
L. 23.5'

Denison samples

1. 5.0' to 7.0'
2. 7.0' to 9.0'
3. 9.0' to 11.0'
4. 11.0' to 13.0'
5. 13.0' to 15.0'
6. 15.0' to 17.0'
7. 17.0' to 18.0'
8. 18.0' to 20.0'
9. 20.0' to 21.7'
10. 21.7' to 23.5'

Carton samples

1. 23.5' to 24.4'
2. 24.4' to 25.3'
3. 25.3' to 26.2'
4. 26.2' to 27.1'
5. 27.9' to 28.8'
6. 30.1' to 31.0'
7. 32.2' to 33.1'
8. 33.1' to 34.0'
9. 34.0' to 34.9'
10. 34.9' to 35.5'
11. 35.5' to 36.4'
12. 36.4' to 37.3'
13. 37.3' to 38.2'
14. 38.2' to 39.1'
15. 39.5' to 40.4'
16. 40.4' to 41.3'
17. 41.3' to 42.0'
18. 42.6' to 43.5'
19. 45.6' to 46.5'

Note

All samples are calcareous. There was insufficient material from 4.0' to 5.0' for an undisturbed sample. Shale is unweathered.

*Water Level

Four inch slotted plastic pipe was set with much difficulty to 42.5'. Hole would not remain clean below this depth. Three day check - dry.

Penetrometer readings

depth	reading
5.0'	4.0
7.0' to 26.0'	>4.5
26.0' to 30.0'	4.25 to 4.5
30.0' to 34.0'	4.75
34.0' to 37.0'	2.5
37.0' to 43.0'	1.5
43.0' to 44.7'	0.5 to 1.0

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT) PROJECT Lakeview Lake HOLE NO. 68-531

Hole No. 86-532

DRILLING LOG	DIVISION Southwestern	INSTALLATION Fort Worth District	SHEET 1 OF 1 SHEETS

1. PROJECT	Lakeview Lake
2. LOCATION	
3. DRILLING AGENCY	Corps of Engineers
4. HOLE NO.	86-532
5. NAME OF DRILLER	Brown
6. DIRECTION OF HOLE	☒ VERTICAL ☐ INCLINED ___ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	40.0'
8. DEPTH DRILLED INTO ROCK	1.0'
9. TOTAL DEPTH OF HOLE	41.0'
10. SIZE AND TYPE OF BIT	8" auger
11. DATUM FOR ELEVATION SHOWN	
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	DISTURBED 11 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	*
16. DATE HOLE	STARTED 24 Jan 75 / COMPLETED 24 Jan 75
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING	%
19. SIGNATURE OF INSPECTOR	[illegible]

ELEVATION | DEPTH | LEGEND | CLASSIFICATION OF MATERIALS (Description) | % CORE RECOVERY | BOX OR SAMPLE NO. | REMARKS

Classification of materials

0.0' to 40.0'

CLAY - -

0.0' to 5.0' medium plasticity, grayish-brown, stiff, very moist

5.0' to 10.0' becomes hard, moist, with occasional calcareous streaks

10.0' to 14.0' becomes brown

14.0' to 16.5 low plasticity, brown, hard, moist, silty

16.5' to 17.0' becomes gravelly, with small well rounded gravels

17.0' to 24.5' low plasticity, brown, hard, moist, silty

24.5' to 34.5' low plasticity, brown, very stiff, moist, silty and sandy

34.5' to 37.0' low plasticity, gray and brown mottled, stiff, very moist, very sandy

37.0' to 40.0' becomes gravelly

40.0' to 41.0'

SHALE - -

Jar A, B, C, D, E, F, G, H, I, J, K, L

Remarks

Drilling

0.0' to 41.0' 8" auger

Jar samples

A. 0.0' to 5.0'
B. 5.0' to 10.0'
C. 10.0' to 14.0'
D. 14.0' to 16.5'
E. 16.5' to 17.0'
F. 17.0' to 22.0'
G. 22.0' to 24.5'
H. 24.5' to 29.5'
I. 29.5' to 34.5'
J. 34.5' to 37.0'
K. 37.0' to 40.0'
L. 40.0' to 41.0'

*Water Level

Hole was left open for measurements; 3 day check - dry.

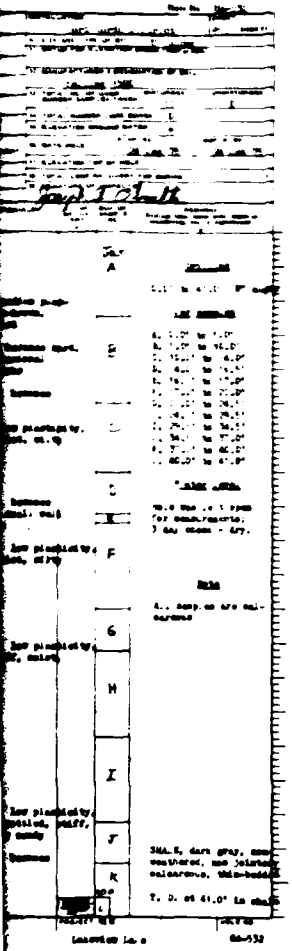
Note

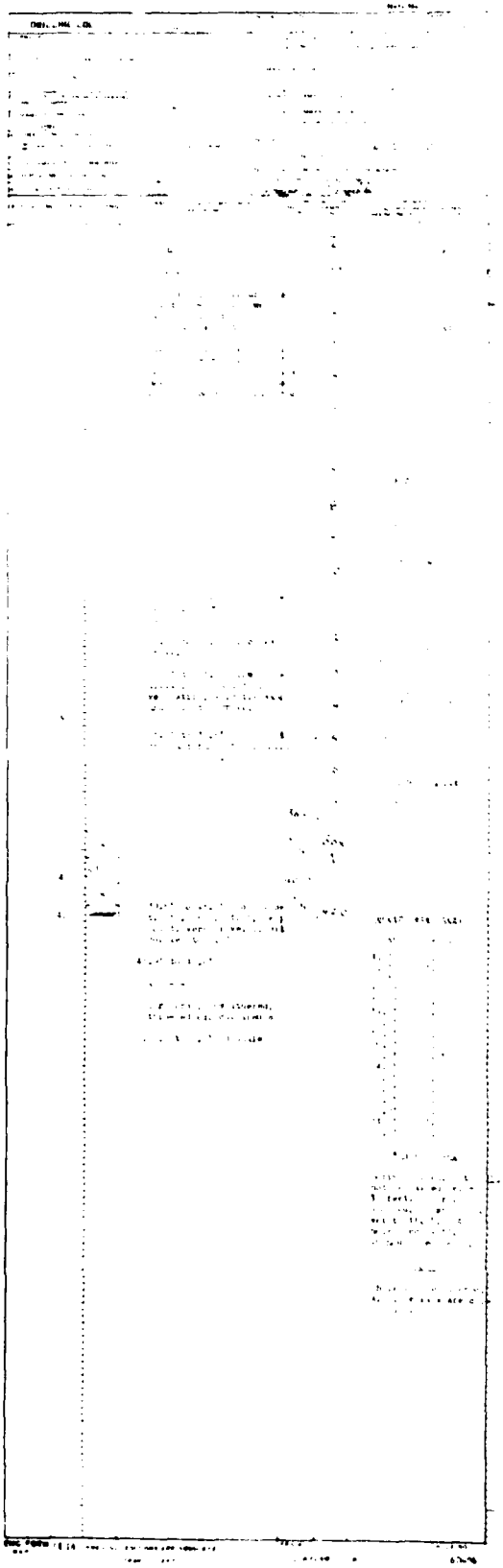
All samples are calcareous

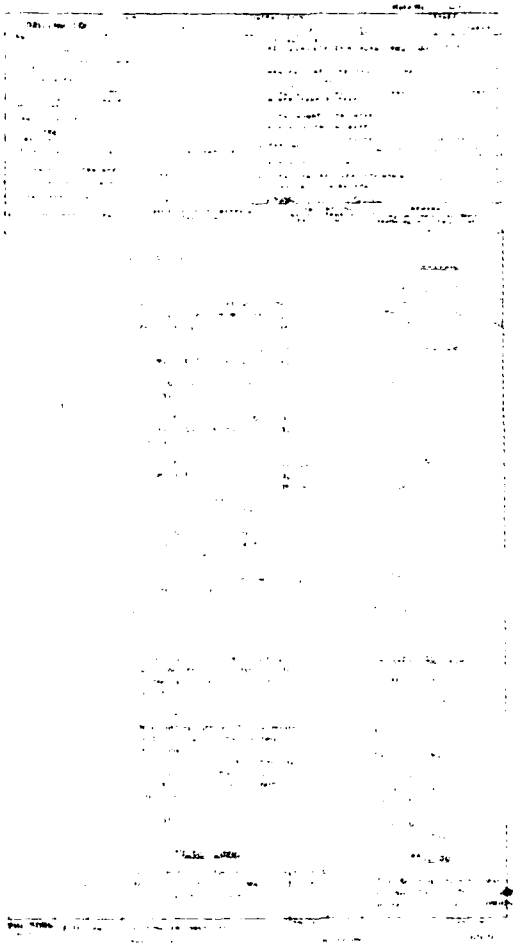
SHALE, dark gray, non-weathered, non jointed, calcareous, thin-bedded

T. D. at 41.0' in shale

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT) PROJECT Lakeview Lake HOLE NO. 86-532







U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

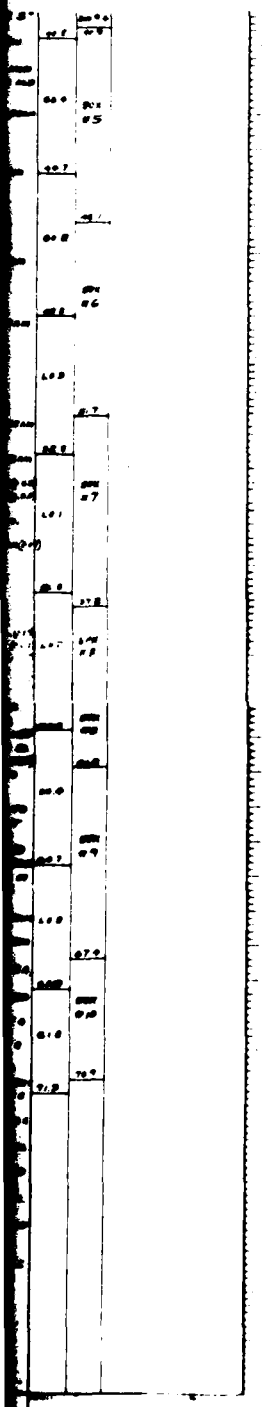
OUTLET WORKS AND INITIAL EMBANKMENTS

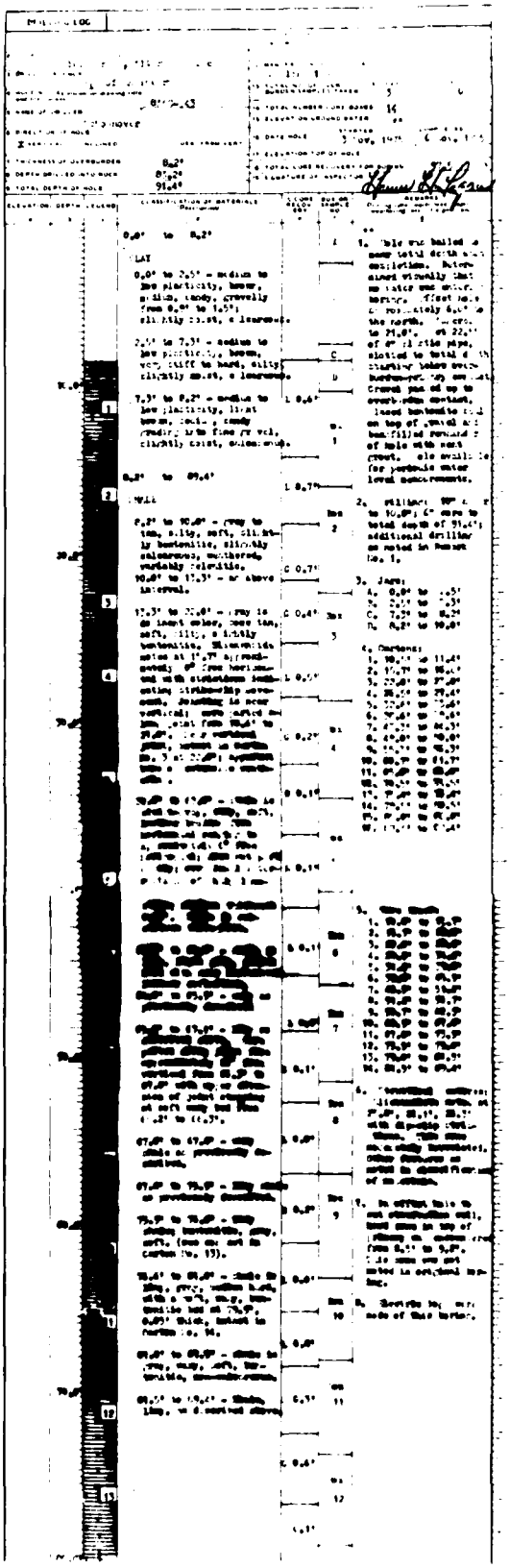
LOGS OF BORINGS
SHEET NO. 33 AND 34 OF

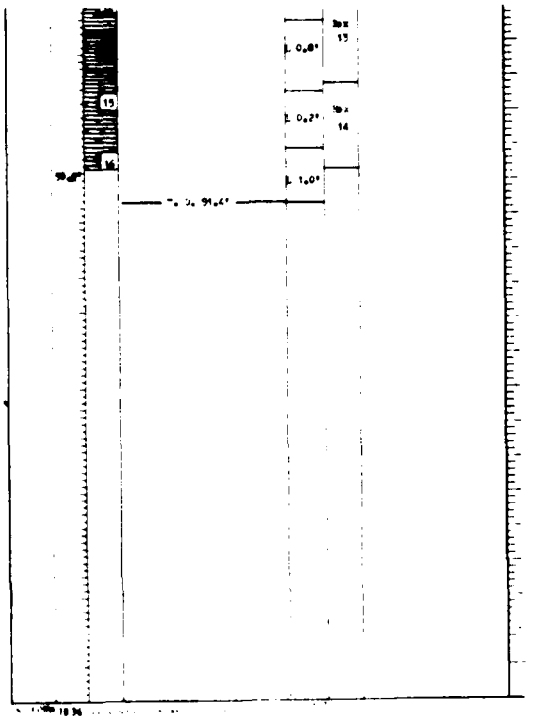
DRILLING LOG — Hole No. [illegible]

Project / Location	[illegible]
Drilling agency	USCE [illegible]
Hole No.	BAGC - 57
Name of driller	CLARK & SCHOCNOVER
Direction of hole	☐ [illegible] ☐ [illegible]
Thickness of overburden	14.8
Depth drilled into rock	56.5
Total depth of hole	71.3
Manufacturer's designation of drill	FAILING [illegible]
No. of overburden samples taken	9 [illegible]
Total number core boxes	10
Geologist	KKR
Date hole	Started 1 AUG 1969 · Completed 5 AUG '69
Elevation top of hole	514.6
Total core recovery for boring	96+ %
Signature of inspector	Charles M. [illegible]

Depth	Classification of materials (Description)	% core recov.	Box or sample no.	Remarks
0	**0.0-0.5** SAND, SILTY, CLAYEY, FN GRN, W/ ROOTS, SL MST, MED, BRN		A	**DRILLING & MISC**
	0.5-2.5 CLAY, SL SD TO SD, FEW RTS, MST TO V MST, V STF, LT YL BRN		B	10" AUGER TO 16.5, REFUSAL TO AUGER AT 16.5. SET 8" CASING TO [illegible].5. 7⅞" ROCK BIT (BAROID MUD) TO 17.0
	2.5-5.5 CLAY, V SANDY, MED CALC, MST, STF, LT BRN TO YL TAN; 2.5-3.0 V CALC STRKS; 3.0-3.5 THIN LENSES OF CLAYEY SAND		C	6" CORE 17.0 TO 27.0. GRAVEL IN HOLE. DROVE CASING TO [illegible]. 7⅞" ROCK BIT (BAROID MUD) TO 27.0
5	**5.5-6.5** CLAY, SANDY, SILTY, V CALC, MST, STF, TAN, LT BRN & LT GREY		D	6" CORE 27.0 TO 71.3. REAMED HOLE TO [illegible]. PULLED CASING [illegible] 5 AUG 1969
	6.5-8.4 SAND, SILTY, TR GR, FN TO MED GRN, CALC, MST, MED, YELLOWISH-TAN		E	SET 3" PLASTIC PIPE TO 30.0 (PERF AT 3.0 TO 30.0) ON 5 AUG 1969. MOVED RIG APPROX 5' SOUTH
			F	3⅞" FISHTAIL TO [illegible]. FISHTAIL HOLE [illegible] TO 30.0
10	**8.4-9.8** SAND, SILTY, CLAYEY, FN TO MED GRN, TR GR, V CALC, MST TO V MST, MED, LT GREY & TAN W/ YL TAN STRKS		G	KKR. BAILED CORE HOLE TO 30.0 ON 5 AUG '69
	9.8-11.4 SAND, CLAYEY, GRAVELLY, SILTY, FN TO CRS GRN, V CALC, V MST, MED, TAN		H	WATER LEVEL AT [illegible] ON 8 AUG 1969. WATER LEVEL AT [illegible] ON 15 AUG 1969
	11.4-14.0 SAND, SL CL TO CL, V GRAVELLY, MED TO CRS GRN, CALC, V MST, MED, LT BRN		I	**JAR SAMPLES:**
15	**14.0-14.8** GRAVEL, [illegible] CL TO CL, V SANDY, MAX SIZE [illegible]" [illegible], SATURATED, MED, TAN		J	A 0.0-0.5; B 0.5 2.5; C 2.5 5.5; D 5.5 6.5; E 6.5 8.4; F 8.4-9.8; G [illegible]; H [illegible]; [illegible]
	14.8-16.5 [illegible] CALC, [illegible] HARD [illegible] TAN [illegible]			
	[illegible] [illegible]			[illegible]
20	**[illegible]** SHALE, [illegible] CALC, UNWEA, SOFT ([illegible]), WEAKLY LAM, [illegible] GREY TO [illegible] GREY		Box #1	1 [illegible]; 2 [illegible]; 3 [illegible]; 4 [illegible]; 5 [illegible]; 6 [illegible]; 7 [illegible]; 8 [illegible]; 9 [illegible]; 10 [illegible]
25	[illegible] BED PL DIP [illegible]°; [illegible] FRAC [illegible]		Box #2	NOTE: [illegible]
30	[illegible] SEAM; [illegible] SANDY LENSES [illegible]; [illegible] BENTONITIC ? SEAM; [illegible] BENTONITIC SEAM ([illegible])		Box #3	
35	**[illegible] - 87.1** FEW [illegible], HARD, V [illegible] LENSES ([illegible]); [illegible] HARD, V CALC, FERRU CLD SEAM ([illegible])		Box #4	
	[illegible]-70.7 BED PL DIP 5° TO 6°; **40.7** V HARD, CALC, FERRU CLD LENS (±0.16); **41.5-47.6** FEW, BCTD, MED HARD, V MARLY SEAMS AND LENSES ([illegible]); **42.6** MED HARD, V MARLY SEAM (0.16 TO 0.08)		Box #5	
40	**46.7** MED HARD, V CALC SEAM (0.03)			
	47.4 MED HARD, V CALC SEAM (0.03)		Box #6	
50	**47.8** MED HARD, V CALC SEAM (0.07)			
	[illegible] MED HARD, V CALC SEAM (0.66); **[illegible]** MED HARD, V CALC SEAM (0.4); **[illegible]** MED HARD, V CALC SEAM ([illegible])		Box #7	
55	**[illegible]** V HARD, CALC & FERRU CLD SEAM (0.4); **[illegible]** MED HARD, V CALC SEAM ([illegible])			
	[illegible] MED HARD [illegible]		Box #8	
60	**[illegible]** [illegible], CALC TO V CALC, [illegible], MED HARD, WEAKLY LAM; [illegible] TO 0.15 THICK [illegible]; [illegible] GREY TO [illegible] GREY		Box #9	
65	**[illegible]** SHALE, SL TO [illegible] CALC, UNWEA, SOFT [illegible], WEAKLY LAM; W/ BCTD, MED HARD TO MOD HARD, MARLY [illegible] ([illegible] TO 0.10 THICK); [illegible] GREY TO [illegible] GREY; **[illegible]** [illegible] BENTONITIC ? [illegible] (0.07); **[illegible]** [illegible] BENTONITIC ? [illegible] (0.08)			
	[illegible]-70.7 SHALE, UNWEA, WEAKLY LAM; **[illegible]** V MARLY, MED HARD & [illegible] GREY; **[illegible]** MED CALC, SOFT & [illegible] GREY; **[illegible]** [illegible] CALC, SOFT & [illegible] GREY		Box #10	
70	**66.7-66.9** MARLY, [illegible] TO CALC, MED HARD & [illegible] GREY; **66.9-67.1** MED CALC, SOFT & [illegible] GREY; **67.1-67.8** MARLY, MED HARD & [illegible] GREY; **67.8-67.7** CALC, [illegible] TO SL CALC, SOFT & DK GREY; **67.7-69.7** MARLY, MED HARD & [illegible] GREY; **69.7-70.5** CALC, SOFT & [illegible] GREY; **70.5-70.7** MARLY, MED HARD & [illegible] GREY			
75	**70.7-71.3** NO RECOVERY - CORE LEFT IN HOLE			







U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY .....
DRAWN BY .....
CHECKED BY .....
SUBMITTED BY .....
APPROVED .....

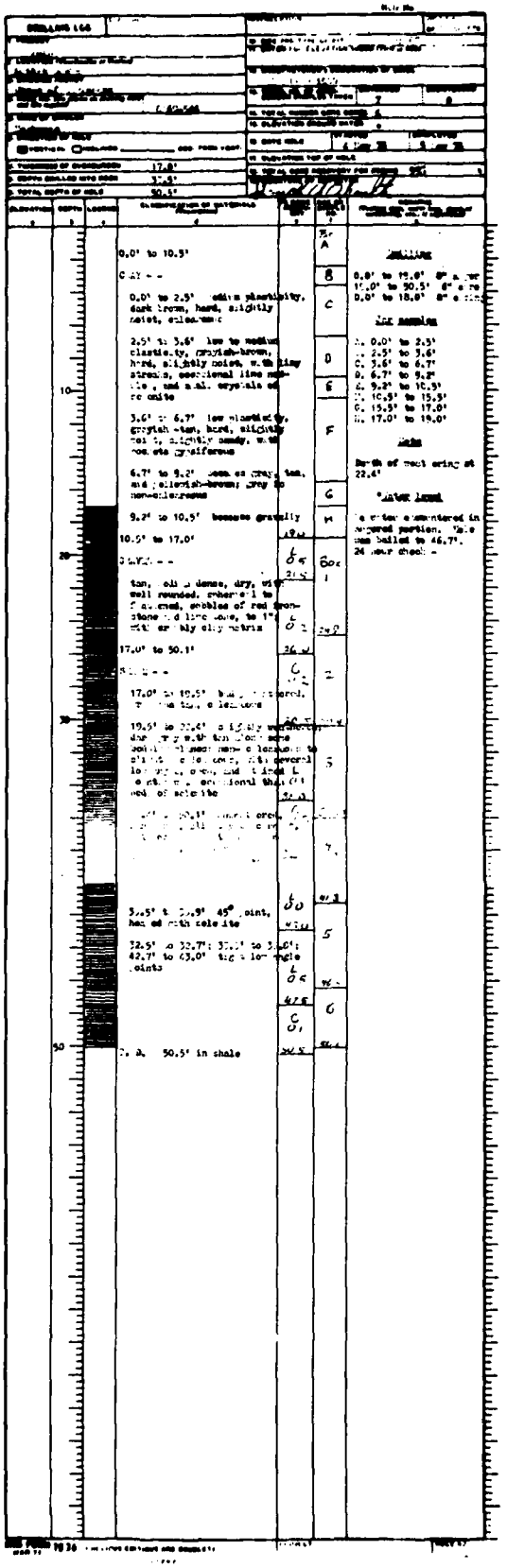
JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

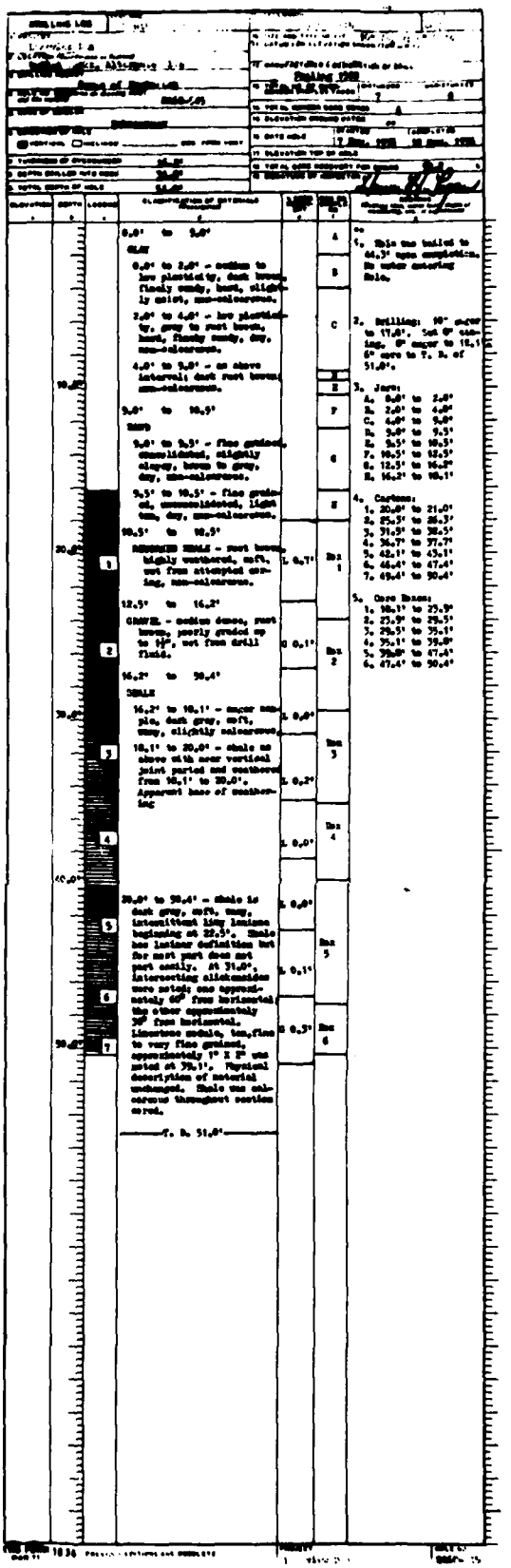
OUTLET WORKS AND INITIAL EMBANKMENTS

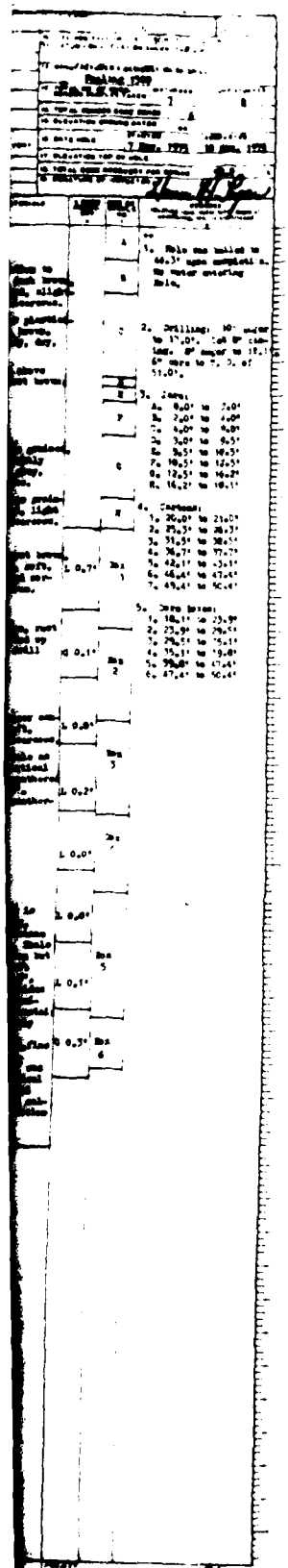
LOGS OF BORINGS
SASC-59 AND SASC-543

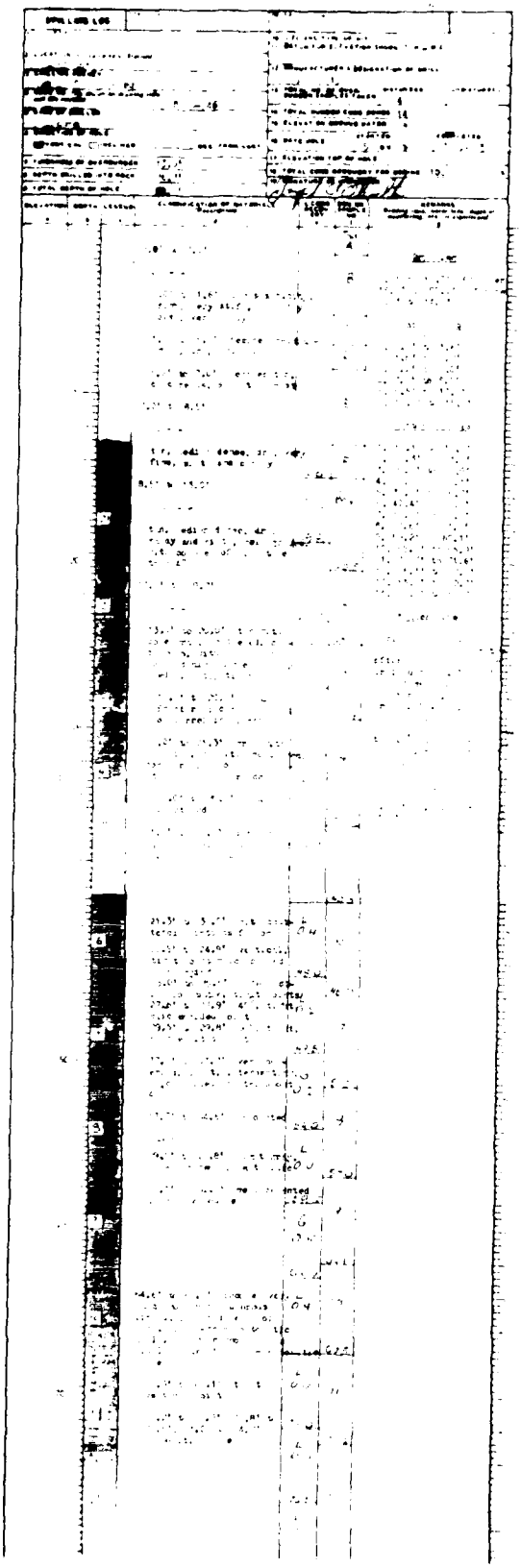
INV NO
DATED
DRAWING NUMBER
SHEET NO
OF
REVISED NO

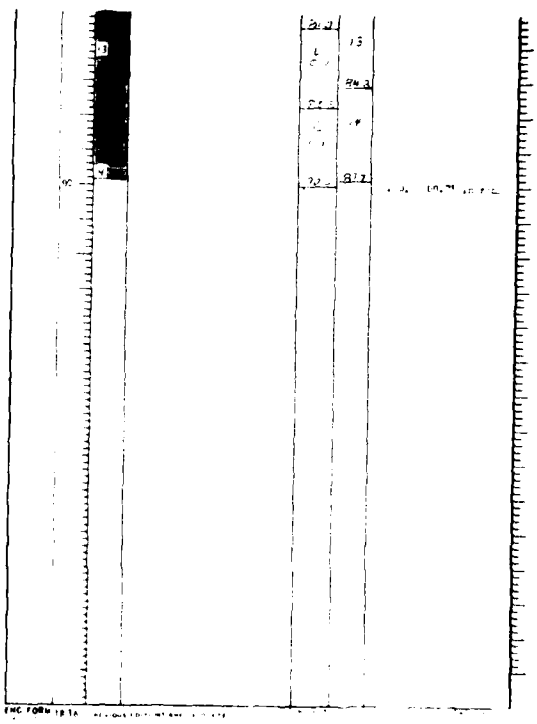
TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 10











U S ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY .....
DRAWN BY .....
CHECKED BY .....

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS AND INITIAL EMBANKMENTS

LOGS OF BORINGS
SASC-544, 546, 548

SUBMITTED BY
ENGINEER

DIV NO
DATES
DRAWING NUMBER
SHEET NO
OF

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 16

DRILLING LOG

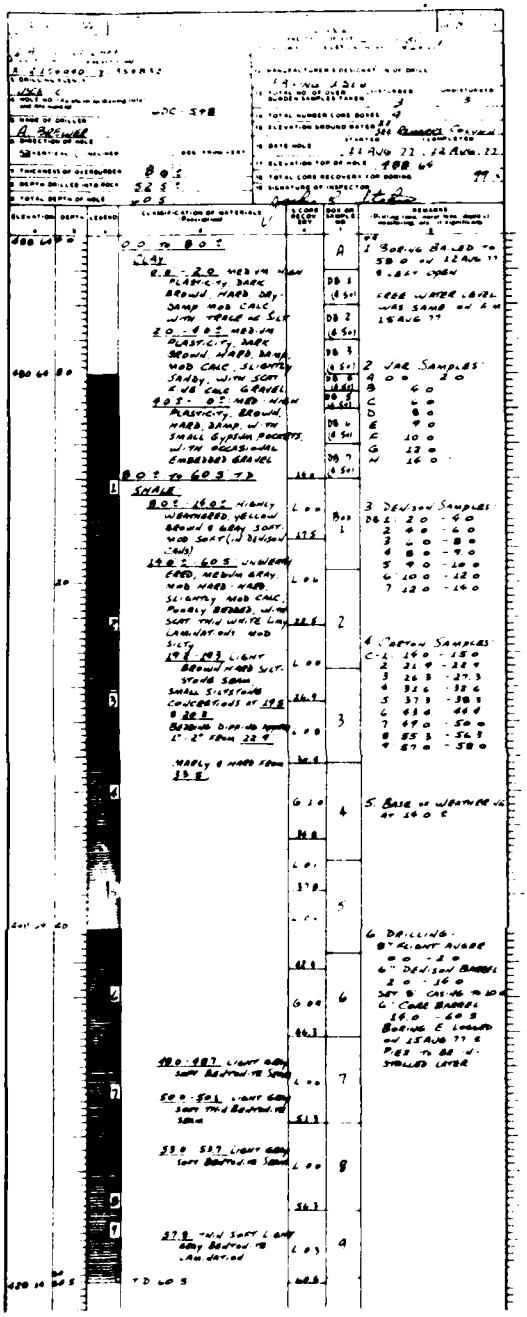
Project	LAKE [illegible]
Location	N 2[illegible] E 355[illegible]
Drilling agency	USCE C
Hole no.	DA 507
Name of driller	A BREWER
Direction of hole	Vertical
Thickness of overburden	10.8
Depth drilled into rock	14.2
Total depth of hole	25.0
Manufacturer's designation of drill	FAILING 1500
Total no. of overburden samples taken (disturbed / undisturbed)	3 / 0
Total number core boxes	N/A
Elevation ground water	None encountered
Date hole (started / completed)	18 Aug 77 / 18 Aug 77
Elevation top of hole	481.35
Total core recovery for boring	N/A
Signature of inspector	[signature]

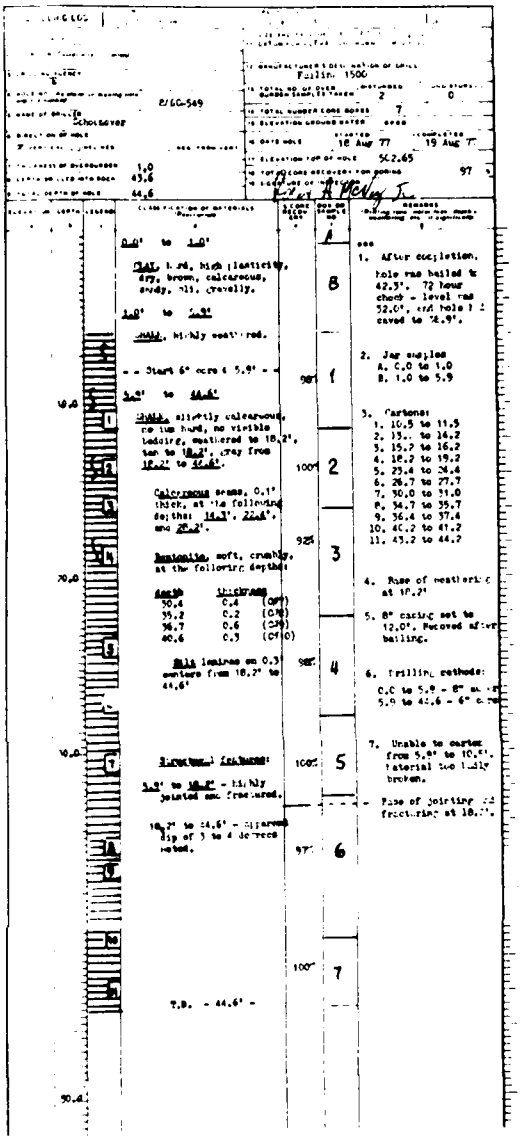
Elevation	Depth	Classification of materials	Box or sample no.	Remarks
481.35	0.0	0.0 to 10.8 CLAY. 0.0 - 5.0 MED - HIGH PLASTICITY, DARK BROWN - BLACK, HARD, DRY - DAMP, CALC, WITH SILTY OCCASIONAL FINE GRAVEL. 5.0 - 10.8 MEDIUM PLASTICITY, BROWN - DARK BROWN TO LIGHT BROWN AT 6.2', HARD, DRY - DAMP, CALC WITH OCCASIONAL FINE EMBEDDED GRAVEL, WITH TRACE OF SILT & SAND TO SLIGHTLY SANDY AT 6.2	A, B, C	1. No free water encountered during drilling. Piezometer was placed in boring for later observation. 2. Jar samples: A 0.0 - 5.0; B 5.0 - 6.2; C 6.2 - 10.8; D 10.8 - 15.0; E 15.0 - 20.0; F 20.0 - 23.1; G 23.1 - 25.0
470.55	10.8	10.8 to 25.0 TD SHALE. 10.8 - 23.1 YELLOW BROWN & GRAY, SOFT - MOD SOFT, HIGHLY WEATHERED, DAMP, MOD CALC, HIGHLY FRACTURED	D, E, F	3. Base of weathering at 23.1. 4. Drilling: 8" flight auger 0.0 - 25.0
	20			
456.35	25.0	23.1 - 25.0 MEDIUM GRAY, MOD HARD, MOD CALC. TD 25.0	G	

DRILLING LOG

Project	[illegible] LAKE
Location	N 2[illegible] E [illegible]
Drilling agency	USCE C
Hole no.	GDS 548
Name of driller	A. BREWER
Direction of hole	Vertical
Thickness of overburden	8.0'
Depth drilled into rock	52.5'
Total depth of hole	60.5
Manufacturer's designation of drill	FAILING 1500
Total no. of overburden samples taken	8
Total number core boxes	9
Elevation ground water	[illegible]
Date hole	11 Aug 77 [illegible]
Elevation top of hole	488.[illegible]
Signature of inspector	[signature]

Elevation	Depth	Classification of materials	% core recovery	Box or sample no.	Remarks
488.6[illegible]	0.0	0.0 to 8.0' CLAY. 0.0 - 2.0 MEDIUM HIGH PLASTICITY, DARK BROWN, HARD, DRY - DAMP, MOD CALC WITH TRACE OF SILT. 2.0 - 4.0' MEDIUM PLASTICITY, DARK BROWN, HARD, DAMP, MOD CALC, SLIGHTLY SANDY, WITH SOFT FINE CALC GRAVEL. 4.0' - [illegible]' MED HIGH PLASTICITY, BROWN, HARD, DAMP, WITH SMALL GYPSUM POCKETS, WITH OCCASIONAL EMBEDDED GRAVEL		A, DS 1 - DS 7	1. Boring [illegible] 50.0' [illegible]. Free water [illegible] 16 Aug [illegible]. 2. Jar samples [illegible]
480.6[illegible]	8.0	8.0' to 60.5' TD SHALE. 8.0' - 19.0' HIGHLY WEATHERED, YELLOW BROWN & GRAY, SOFT - MOD SOFT (IN DENISON CORE). 19.0' - 60.5' UNWEATHERED, MEDIUM GRAY, MOD HARD - HARD, SLIGHTLY - MOD CALC, POORLY BEDDED, WITH SOFT THIN WHITE LAYER LAMINATIONS, MOD SILTY. 19.8 - 19.9 LIGHT BROWN HARD SILTSTONE SEAM. SMALL SILTSTONE CONCRETIONS AT 19.9 & 30.5. BEDDING DIPPING APPROX 1° - 2° FROM 28.9'. MARLY & HARD FROM 39.8'		Box 1, 2, 3, 4, 5	3. Denison [illegible]. 4. Carton [illegible]. 5. Base of [illegible] at 19.0'
	20				
4[illegible]	40	48.0 - 48.3 LIGHT GRAY SOFT BENTONITE SEAM. 50.0 - 50.1 LIGHT GRAY SOFT THIN BENTONITE SEAM. 53.0 - 53.1 LIGHT GRAY SOFT BENTONITE SEAM. 57.5 THIN SOFT LIGHT GRAY BENTONITE LAMINATION		6, 7, 8, 9	6. Drilling: 8" [illegible] 0.0 - [illegible]; 6" Denison 2.0 - [illegible]; set 8" [illegible]; 6" core [illegible] 19.0' - [illegible]. Boring [illegible] on 15 Aug [illegible] piez. [illegible] installed
4[illegible]	60.5	TD 60.5			





U S ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS	
DESIGNED BY	JOE POOL LAKE MOUNTAIN CREEK, TEXAS
DRAWN BY	OUTLET WORKS AND INITIAL EMBANKMENTS
CHECKED BY	LOGS OF BORINGS 8A-647, 8DC-548, 8A8C-549
SUBMITTED BY	INV NO
ENGINEER	DATED
	DRAWING NUMBER / SHEET NO OF
	SUPERSEDES NO

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 17

DRILLING LOG

1. PROJECT: [illegible] Dam	12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
3. DRILLING AGENCY: USCE	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: Disturbed 5, Undisturbed 4
4. HOLE NO. (As shown on drawing title and file number): WDC-550	14. TOTAL NUMBER CORE BOXES: 14
5. NAME OF DRILLER: Schoonover	15. ELEVATION GROUND WATER: ****
6. DIRECTION OF HOLE: ☒ Vertical ☐ Inclined ____ Deg. from vert.	16. DATE HOLE: Started 11 Aug 77, Completed 16 Aug 77
7. THICKNESS OF OVERBURDEN: 9.6	17. ELEVATION TOP OF HOLE: 496.85
8. DEPTH DRILLED INTO ROCK: 81.0	18. TOTAL CORE RECOVERY FOR BORING: 92 %
9. TOTAL DEPTH OF HOLE: 90.6	19. SIGNATURE OF INSPECTOR: [signature]

Classification of materials (Description)

0.0' to 5.6'

GRAVEL, medium dense, coarse-grained, moist, brown to yellow, clayey, sandy, calcareous.

5.6' to 8.6'

CLAY, high plasticity, hard, moist, yellow brown, sandy, occas. gravel from 6.6' to 8.6'.

8.6' to 9.6'

GRAVEL, medium dense, coarse grained, moist, clayey, calcareous.

9.6' to 90.6'

SHALE, slightly calcareous, medium hard, no visible bedding, weathered and tan to 14.5', gray from 14.5' to 90.6'

Calcareous seams, 0.05' average thickness, at the following depths 16.2', 18.2', 20.1', 26.7', and 27.2'

Bentonite, soft, crumbly, at the following depths

depth	thickness
*17.4	0.3
33.5	0.1
64.1	0.6
65.9	0.1
*69.5	0.5
*74.0	0.1
*79.8	0.2
83.3	0.1
*85.9	0.1
*86.5	0.1
*88.0	0.1
90.6	0.1

Structural features:

9.6' to 14.5' - numerous open, vertical joints. Fracture, 24°, with weathered traces of slickensides, from 14.1 to 14.3

Apparent dip of two to three degrees noted from 71.4' to 90.6'.

71.4' to 90.6' - numerous gypsum veins (1 to 2 mm thick).

Core recovery / Box or sample no.

% Core Recovery	Box or Sample No.
	A
	1
	2
	3
	4
	☒
92%	1
100%	2
100%	3
100%	4
100	5
100%	6
100%	7
92%	8
100%	9
100%	10
78%	11
100	12
100%	13
80%	14

Remarks

NOTE

1. Hole was bailed dry after completion. 24 hr. check - hole was dry.

2. Jars:
   - A. 0.0 to 2.6
   - B. @ 2.6 (Denison + ...)
   - C. @ 4.6 "
   - D. @ 6.6 "
   - E. @ 8.6 "

3. Denison cans:
   1. 2.6 to 4.6
   2. 4.6 to 6.6
   3. 6.6 to 8.6
   4. 8.6 to 10.6

4. Cartons:
   1. 12.9 to 13.9
   2. 16.8 to 17.8
   3. 23.9 to 24.9
   4. 28.6 to 29.6
   5. 33.5 to 34.5
   6. 37.0 to 38.0
   7. 42.7 to 43.7
   8. 46.6 to 47.6
   9. 51.8 to 52.8
   10. 58.3 to 59.3
   11. 63.1 to 64.1
   12. 69.2 to 70.2
   13. 73.3 to 74.3
   14. 78.9 to 79.9
   15. 82.5 to 83.5
   16. 85.7 to 86.7
   17. 88.8 to 89.8

5. Base of weathering at 14.5'.

6. Casing set to 16'

7. Hole was "E" logged after completion

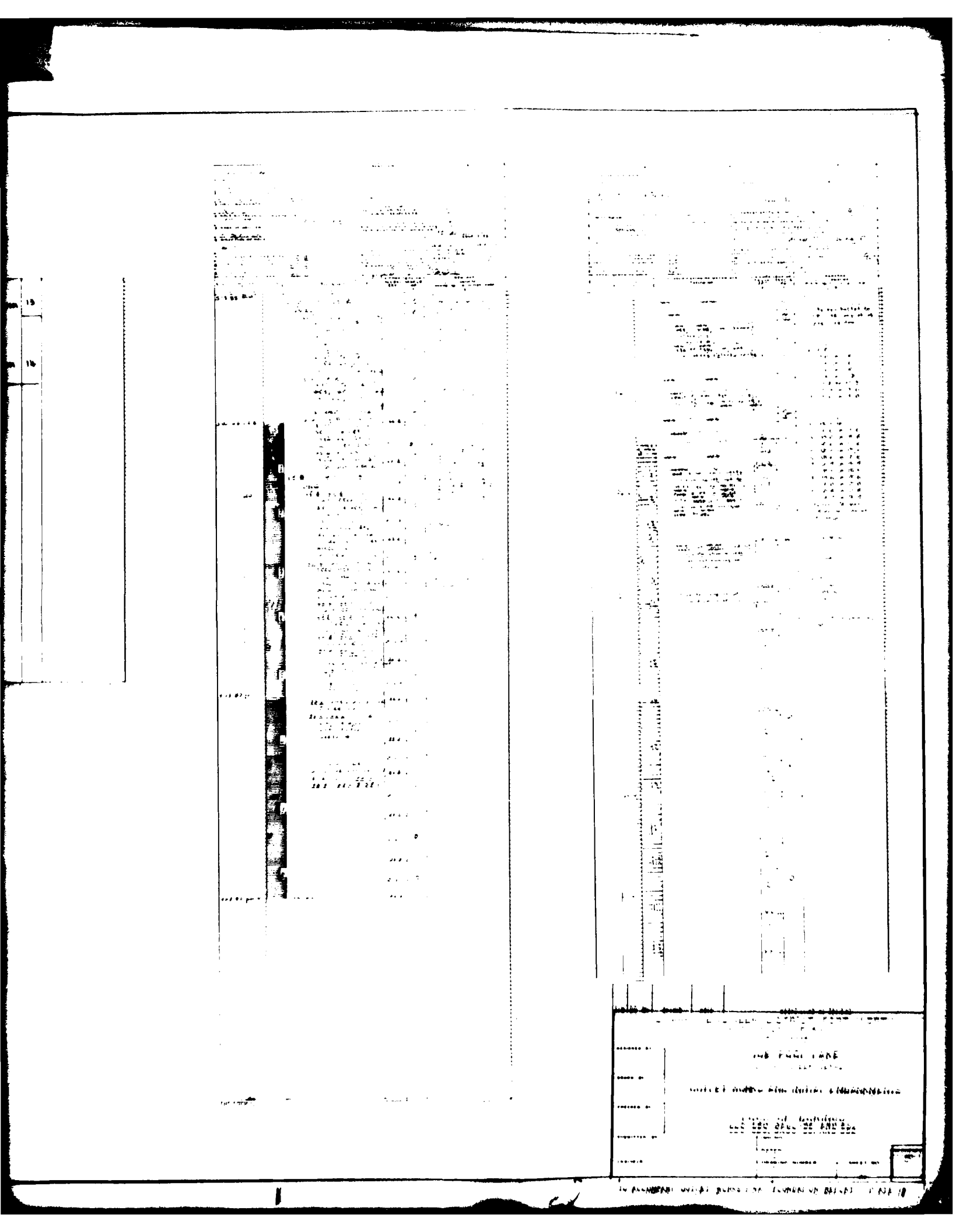
8. Drilling methods: 0.0 to [illegible] [illegible]

[illegible] ... sampled

Base of major fracturing and jointing at 14 [illegible]

T.D. = 90.6' =

ENG FORM 1836



DRILLING LOG

Sheet 1 of 2 sheets

Location (Coordinates or Station)	[illegible] 470 [illegible] 222 [illegible]
Drilling Agency	[illegible]
Hole No. (As shown on drawing title and file number)	BAGC-553
Name of Driller	Breuer
Direction of Hole	☒ Vertical ☐ Inclined ___ Deg. from Vert.
Thickness of Overburden	16.0
Depth Drilled into Rock	63.6
Total Depth of Hole	79.6
Manufacturer's Designation of Drill	[illegible] 1500
Total No. of Over-Burden Samples Taken	Disturbed: 5 / Undisturbed: 0
Total Number Core Boxes	11
Elevation Ground Water	[illegible]
Date Hole	Started: 31 Aug 77 / Completed: 2 Sept 77
Elevation Top of Hole	519.84
Total Core Recovery for Boring	94.1 %
Signature of Inspector	[illegible]

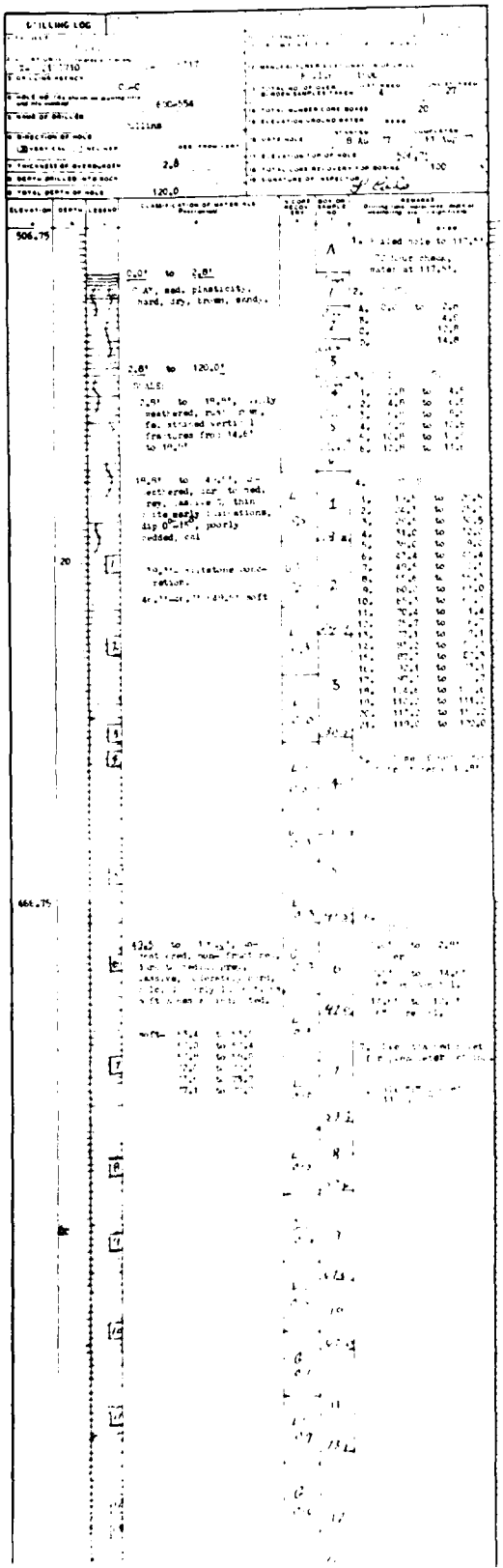
Elevation	Depth	Legend	Classification of Materials (Description)	% Core Recovery	Box or Sample No.	Remarks (Drilling time, water loss, depth of weathering, etc., if significant)
			0.0' to 3.0' CLAY, low plasticity, stiff, dry, dark brown, calcareous.		A	1. After completion, hole was bailed dry and casing was pulled. 72 hour check - level was 11.4'.
			3.0' to 16.0' CLAY, medium to high plasticity, stiff, moist, tan and gray, sandy from 8.0' to 12.0', gravelly from 15.0' to 16.0'		B	2. Jars: A, 0.0 to 3.0; B, 3.0 to 8.0; C, 8.0 to 12.0; D, 12.0 to 16.0; E, 16.0 to 16.5
	10.0		**16.0' to 16.5'** SHALE, slightly calcareous, weathered, tan.		[illegible]	3. Cartons: 1, 17.2 to 18.0; 2, 26.8 to 27.5; 3, 29.2 to 30.2; 4, 34.6 to 35.6; 5, 39.0 to 40.0; 6, 43.0 to 44.0; 7, 47.9 to 48.9; 8, 52.6 to 53.6; 9, 57.5 to 58.5; 10, 62.4 to 63.4; 11, 67.5 to 68.5; 12, 73.2 to 74.0; 13, 77.7 to 78.7. Note: CF5 contains high angle healed fracture. CF11 contains 1" lignite seam. CF12 contains ½" bentonite seam.
			- - Start 6" core at 16.5' - -		C	
	20.0		**16.5' to 79.6'** SHALE, slightly calcareous, medium hard, no visible bedding, weathered to 28.8', tan to 28.8', gray from 28.8' to 79.6'. 70.4' to 79.6' slightly harder and marly.	[illegible]	1	4. Base of weathering at 28.8'.
			67.5' - ½" lignite seam		2	5. Hole was "X" [illegible] after completion.
	30.0		73.7' - ½" bentonite seam, soft, crumbly.		3	
			STRUCTURAL FEATURES 16.5' to 28.8' - numerous high angle joints and fractures with weathered traces of slickensides. @ 31.0' - "X" shaped fractures. @ 35.0' - selenite healed fracture			- - - Base of jointing and fracturing at 35.[illegible]'.
			Silt laminae on approximately 0.2' to 1.0' centers, with apparent dip of 0.2 to 0.5 degrees noted throughout.			

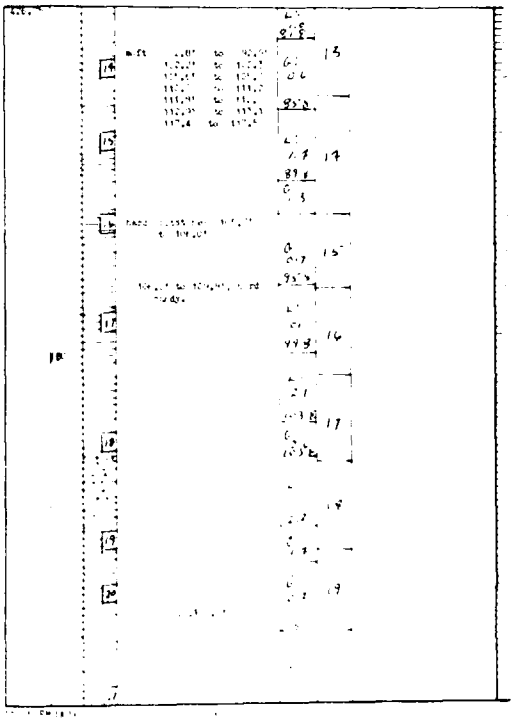
DRILLING LOG

Location (Coordinates or Station)	X- [illegible] 5710 Y- [illegible] 5317
Drilling Agency	[illegible]
Hole No. (As shown on drawing title and file number)	6[illegible]-554
Name of Driller	[illegible]lling
Direction of Hole	☒ Vertical ☐ Inclined ___ Deg. from Vert.
Thickness of Overburden	2.8
Depth Drilled into Rock	
Total Depth of Hole	120.0

Elevation	Depth	Legend	Classification of Materials (Description)
506.75			**0.0' to 2.8'** CLAY, med. plasticity, hard, dry, brown, sandy.
			2.8' to 120.0' SHALE: 2.8' to 18.8', highly weathered, rust brown, fe. stained vertical fractures from 14.6' to 18.8'
			18.8' to 49.5', unweathered, dark to med. grey, massive w/ thin [illegible] marly laminations, dip 0°-15°, poorly bedded, cal:
	20		39.5' - siltstone concretion. 46.3'-46.7' (49.5' soft
464.75			49.5' to [illegible], unweathered, some fractures, dark to medium grey, massive, moderately hard, [illegible] soft zones as indicated.
			soft - [illegible]

1





U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS	
DESIGNED BY	JOE POOL LAKE MOUNTAIN CREEK, TEXAS
DRAWN BY	OUTLET WORKS AND INITIAL EMBANKMENTS
CHECKED BY	LOGS OF BORINGS 8A6C-553 AND 6DC-554
SUBMITTED BY	LOW NO.
ENGINEER	DATED DRAWING NUMBER SHEET NO. OF SEQUENCE NO.

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 19

DRILLING LOG

Project: LAKEVIEW LAKE
Location (Coordinates or Station): X 2153930 Y 155370
Drilling Agency: USCE-C
Hole No. (As shown on drawing title and file number): BALC-555
Name of Driller: A. BREWER
Direction of Hole: ☒ Vertical ☐ Inclined
Thickness of Overburden: 12.0'
Depth Drilled into Rock: 64.7'
Total Depth of Hole: 76.7'
Manufacturer's Designation of Drill: FAILING 1500
Total No. of Overburden Samples Taken: Disturbed 5 | Undisturbed 0
Total Number Core Boxes: 11
Elevation Ground Water: See Remarks Column
Date Hole: Started 8 AUG 77 | Completed 22 AUG 77
Elevation Top of Hole: 513.55
Total Core Recovery for Boring: 100 %
Signature of Inspector: [signature]

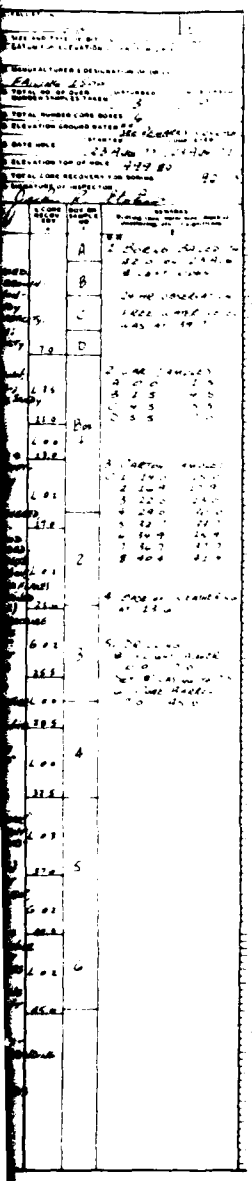
Elevation	Depth	Classification of Materials (Description)	% Core Recovery	Box or Sample No.	Remarks
513.55	0.0	0.0 to 6.0 CLAY: 0.0 - 1.0' Low plasticity, brown, hard, dry-damp, non-calc, silty, sandy. 1.0 - 6.0': Low plasticity, orange, hard, dry, non-calc, mod sandy		A, B	1 Boring bailed to 71.3' on 22 AUG & left open. 24 HR observation: free water level was at 69.6
		6.0 to 8.2 SAND: Fine grained, yellow, medium, dry-damp, non-calc, slightly clayey to slightly silty at 7.5		C, D	2 Jar Samples: A 0.0 - 1.0; B 1.0 - 6.0; C 6.0 - 7.5; D 7.5 - 8.2; E 8.2 - 12.0; F 12.0 - 14.0
501.55	12.0	8.2 to 12.0 GRAVEL: Graded, reddish brown, medium, damp, calc, very clayey with re-worked primary, sandy	14.0	E, F	
		12.0' to 76.7 TD SHALE: 12.0 - 20.6 Highly weathered, yellow brown & gray, soft - mod soft, highly fractured & broken (unable to carton sample above 18.8'). Slightly calc, with no visible bedding	100 / 17.2 / 100 / 20.5	Box 1	3 Carton Samples: C-1 18.8 - 19.5; 2 20.6 - 21.6; 3 24.5 - 25.5; 4 27.1 - 28.1; 5 28.1 - 29.1; 6 31.4 - 32.4; 7 36.0 - 39.0; 8 41.0 - 42.0; 9 45.5 - 46.5; 10 51.2 - 52.2; 11 57.1 - 58.1; 12 63.7 - 64.7; 13 69.2 - 70.2; 14 75.7 - 76.7
	20	20.6 - 76.7 Unweathered medium gray, mod hard - hard, mod calc, poorly bedded, with scat thin white limy or gyp laminations, mod silty with scat minute mica flakes. 28.0 - 21.3 stained - healed high angle fracture (in carton # 2). 22.2 - 25.7 several intersecting open fractures. 24.5 - 25.5 high angle well healed fracture. 25.5 - 26.0 mod soft bentonitic shale. 28.5' open fracture & base of fracturing	100 / 26.5 / 100 / 32.7 / 100 / 30.5 / 100 / 34.5 / 100 / 37.7	2, 3, 4	4 Base of weathering at 20.6. 5 Drilling: 8" flight auger 0.0 - 13.0; set 8" casing to 13.0; cleaned out to 14.0; 6" core barrel 14.0 - 76.7; Boring E logged on 22 Aug 77
	40	Light brown hard siltstone concretions at 37.6, 43.0, 48.5 & 50.1	100 / 41.1 / 100	5	
			46.1 / 100 / 50.5	6	
		54.9: white limy streak	100 / 54.5 / 100 / 56.7	7	
	60	59.7 marly streaks, hard	100 / 61.5	8	
		63.2 scat thin softer silty seams. 63.7 - 76.7 bedding dipping approx 2°. 65.6 - 65.8 soft thin bentonite seam	100 / 65.1	9	
			100 / 69.5 / 100 / 73.5	10	
436.85	76.7	76.1' - 76.7' soft light gray bentonite seam (carton 14)	100 / 76.7	11	
		TD 76.7			

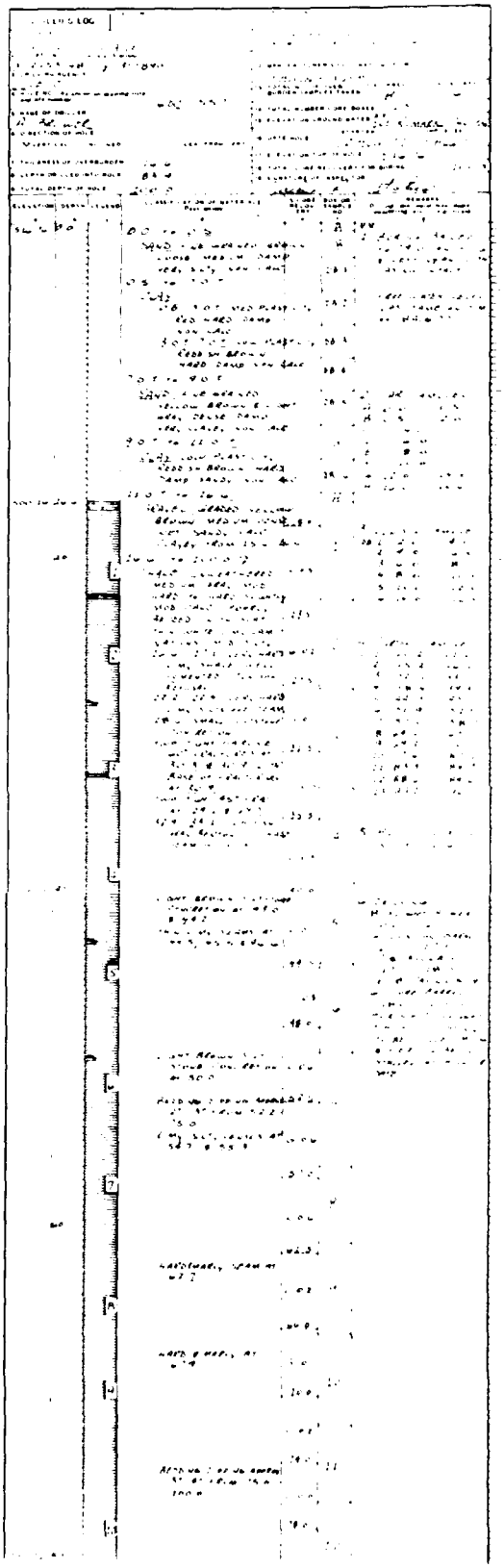
ENG FORM 1836

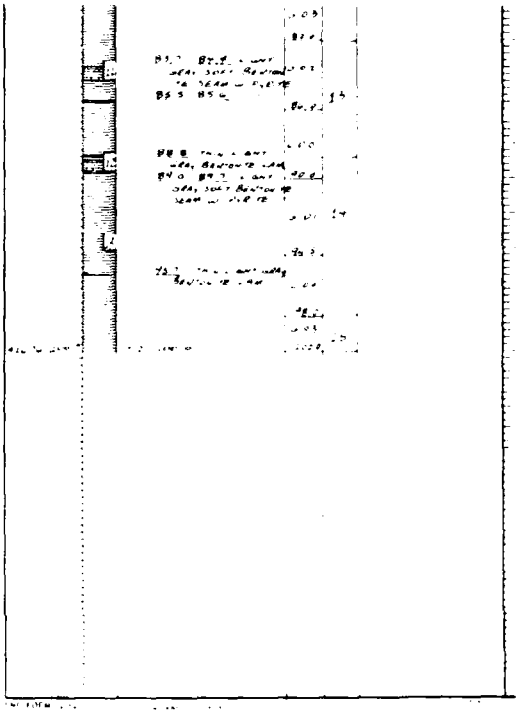
DRILLING LOG

Project: LAKEVIEW LAKE
Location (Coordinates or Station): X 2154070 Y 155270
Drilling Agency: USCE-C
Hole No. (As shown on drawing title and file number): BALC-556
Name of Driller: B. MULLINS
Direction of Hole: ☒ Vertical ☐ Inclined
Thickness of Overburden: 5.5'
Depth Drilled into Rock: 39.5'
Total Depth of Hole: 45.0'
Manufacturer's Designation of Drill: FAILING 1500
Total No. of Overburden Samples Taken: Disturbed 3 | Undisturbed 0
Total Number Core Boxes: 6
Elevation Ground Water: See Remarks Column
Date Hole: Started 23 AUG 77 | Completed 23 AUG 77
Elevation Top of Hole: 499.80
Total Core Recovery for Boring: 90 %
Signature of Inspector: [signature]

Elevation	Depth	Classification of Materials (Description)	% Core Recovery	Box or Sample No.	Remarks
499.80	0.0	0.0' to 4.5' CLAY: 0.0 - 1.5: Low-med plasticity, dark brown, stiff, moist, non-calc, silty, sandy. 1.5 - 4.5 med plasticity, brown, hard, dry, calc, slightly silty	7.0	A, B, C, D	1 Boring bailed to 42.0 on 23 Aug & left open. 24 HR observation: free water level was at 39.7
494.30	5.5	4.5 to 5.5 GRAVEL: Graded, brown, medium, dry, calc, very clayey, silty, sandy	100 / 11.0	Box 1	2 Jar Samples: A 0.0 - 1.5; B 1.5 - 4.5; C 4.5 - 5.5; D 5.5 - 7.0
		5.5 to 45.0 TD SHALE: 5.5' - 13.6 mod weathered, gray & yellow brown, soft - mod soft, highly fractured, badly broken	100 / 13.0 / 101		3 Carton Samples: C 1 14.0 - 15.0; 2 16.9 - 17.9; 3 22.0 - 23.0; 4 29.0 - 30.0; 5 32.7 - 33.7; 6 34.9 - 35.9; 7 36.7 - 37.7; 8 40.4 - 41.4
	20	13.6' - 45.0 unweathered medium gray; mod hard; slightly - mod calc, poorly bedded, with scat thin white limy or gyp laminations, mod silty, with mica flakes. 14.0 - 15.0' open stained fractures (carton 1). 16.9' - 17.7' tight fracture. 18.9' - 45.0 bedding dipping approx 7°. 22.5' small light brown siltstone concretion. 22.1 - 22.8: high angle tight fracture. 22.8 - 23.0' light gray soft bentonite seam	19.0 / 101 / 21.6 / 102 / 26.5 / 100 / 29.5	2, 3	4 Base of weathering at 13.6. 5. Drilling: 8" flight auger 0.0 - 7.0; set 8" casing to 7.0; 6" core barrel 7.0 - 45.0
		Calcite lined high angle open slicks at 19.0 - 19.6' & 20.1 - 20.9. 29.7 siltstone concretion. 32.5 - 38.7 30° slicks. 32.7 - 45.0 abundant tight 50° slicks on 4" centers (cartons 5 & 6). 36.2 - 37.5 fault plane approx 50°. Shale on left side of plane appears harder & evenly bedded while material on right of plane resembles "gouge". It is softer & contains more moisture, it resembles the finely abraded material that results from a grinding movement. 39.9 & 41.5: light brown silty bands. 42.5 & 43.7: open 50° slicks	100 / 33.5 / 109 / 37.0 / 101 / 40.5 / 102	4, 5, 6	
454.80	45.0		45.0		
		TD 45.0			







U S ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY

DRAWN BY

CHECKED BY

SUBMITTED BY

ENGINEER

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS AND INITIAL EMBANKMENTS

LOGS OF BORINGS
BA6C-555 AND 556, 6DC-557

REV NO

DATED

DRAWING NUMBER

SHEET NO OF

REFERENCE NO

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 20

DRILLING LOG

3. LOCATION	Y- [illegible]
3. DRILLING AGENCY	[illegible]
4. HOLE NO.	BACC-150
5. NAME OF DRILLER	Brewer
6. DIRECTION OF HOLE	Vertical
7. THICKNESS OF OVERBURDEN	16.0'
8. DEPTH DRILLED INTO ROCK	49.6'
9. TOTAL DEPTH OF HOLE	65.6'
12. MANUFACTURER'S DESIGNATION OF DRILL	Failin 1 00
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	Disturbed 7 / Undisturbed 0
14. TOTAL NUMBER CORE BOXES	8
16. DATE HOLE	Started 2 Sep 77 / Completed 12 Sep 77
17. ELEVATION TOP OF HOLE	519.84
18. TOTAL CORE RECOVERY FOR BORING	76%
19. SIGNATURE OF INSPECTOR	

Classification of materials (Description):

0.0' to 15.0'

CLAY:

0.0' to 2.5', low to medium plasticity, hard, dry, black, calc.

2.5' to 4.0', medium to high plasticity, dry, hard, calc., dark grey.

4.0' to 15.0', med. plasticity, stiff, slightly moist, tan & grey, thin seam of sand visible at 12.0'.

13.0' to 13.5', becomes gravelly.

13.5' to 15.0', high plasticity, stiff, moist, tan & grey with small calc. nodules.

15.0' to 16.0'

SAND, fine grained, medium dense, v. moist, slightly clayey, tan, calc.,

16.0' to 17.0'

SHALE, slightly calc., red, hard, weathered, tan

- - Start 6" core at 17.0' - -

17.0' to 65.6'

SHALE, slightly calc., soft to medium hard, no visible bedding, weathered tan to 23.4' grey from 23.4' to 65.6' light grey silt laminae on approximately 0.2' to 0.9' centers throughout.

19.2' to 19.8' - hard [illegible] concretion.

33.6' to 33.9' grey-blue [illegible].

- - Structural features - -

17.0' to 29.4' - numerous [illegible] fractures and joints with noticeable [illegible] traces of slickensides

36.3' to 36.8' - well developed slickensides at 40 degrees.

4[illegible].8' ½" siltstone concretion.

52.3 ½" to 1" siltstone concretion.

Apparent dip of two to 10 degrees noted throughout entire depth.

Box or sample no.: A, B, C, D, E, F, G, 1, 2, 3, 4, 5, 6, 7, 8

Remarks:

1. **** After augering to 15.0', water was observed coming in at 12.[illegible]' after 72 hours water level was at 11.1'.

2. Jars:

A.	0.0	to	2.5
B.	2.5	to	4.0
C.	4.0	to	8.5
D.	8.5	to	13.0
E.	13.0	to	13.5
F.	13.5	to	15.0
G.	15.0	to	16.0

3. Cartons:

1.	25.2 to 26.2
2.	27.4 to 28.4
3.	32.9 to 33.9
4.	36.6 to 37.6
5.	41.5 to 42.5
6.	46.9 to 47.9
7.	52.6 to 53.6
8.	57.5 to 58.5
9.	61.6 to 62.6
10.	64.4 to 65.4

Note: C# 2 contains a weathered fracture at 40 degrees. C# 3 contains bl[illegible] grey bentonitic zone. C# 4 part of well developed slickenside on top of sample. C# 7 [illegible] of slightly softer material & small pyrite concretions.

4. Base of [illegible] at 29.4'

5. Moved drill rig [illegible] north and fishtale to 127.0' w/ 2 7/8" bit, electrically logged hole.

- Base of fracturing and jointing 36.8'

DRILLING LOG

4. HOLE NO.	BACC-159
5. NAME OF DRILLER	Brewer
6. DIRECTION OF HOLE	Vertical
7. THICKNESS OF OVERBURDEN	14.5
8. DEPTH DRILLED INTO ROCK	75.5
9. TOTAL DEPTH OF HOLE	90.0
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	5 / 0
14. TOTAL NUMBER CORE BOXES	17
16. DATE HOLE	Started 15 Sept 77
17. ELEVATION TOP OF HOLE	522.6[illegible]
19. SIGNATURE OF INSPECTOR	[signature]

Classification of materials (Description):

0.0' to 14.5'

CLAY:

0.0' to 4.0', high plasticity, dry to slightly moist, dark grey, calcareous.

4.0' to 7.0', high plasticity, stiff, slightly moist, grey to tan w/ small calc. nodules

7.0' to 14.5', high plasticity, stiff, moist to v. moist, tan, calc. w/ lime pockets, sandy below 12.0'

14.5' to 15.0'

SHALE, calc. med. hard, weathered, tan.

- - Start 6" core at 15.5' - -

15.5' to 65.8'

SHALE, calcareous, med. hard to hard, no visible bedding.

15.5' to 26.1', highly weathered, tan w/ numerous selenite healed fractures.

26.1' to 32.8', partly weathered w/ numerous [illegible] joints and fractures, few selenite healed fractures.

32.8' to 35.0', mostly grey w/ staining and [illegible] along fractures and joints.

35.0' to 71.9', grey, unweathered, med. hard.

71.9' to 89.8', hard and [illegible] except for bentonite zones.

[illegible]7.7' to 37.4' - [illegible]

[illegible]

[illegible]

Structural features

30.5' to 3[illegible].8' - weathered fracture w/ traces of slickensides.

34.0' to 39.8' - weathered fracture at 60 degrees.

[illegible] to 36.3' - X shaped fracture

Light grey [illegible] laminae on approximately 0.2' to 1.0' centers with apparent dip of 0.2 to 0.9 degrees noted throughout entire depth of hole.

% core recovery: L-0.5 / 17.5; L-0.0 / 21.8; G-0.2 / 26.3; L-0.4 / 30.9; G-0.3 / 35.1; L-0.2 / [illegible]; L-0.0 / 44.3; L-0.0 / 48.5; L-0.0 / 52.3; L-0.3 / 56.8; L-0.1 / 60.8; G-0.1 / 64.5; L-0.3 / 68.8; G-0.1 / 72.8; L-0.1; L-0.0

Box or sample no.: A, B, C, D, E, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

Remarks:

***

1. After [illegible], hole was [illegible] to 7.0. [illegible] water in hole after [illegible] hours.

2. Jars

A.	0.0	to	4.0
B.	4.0	to	7.0
C.	7.0	to	12.[illegible]
[illegible]	12.[illegible]	to	14.[illegible]
[illegible]	14.[illegible]	to	15.[illegible]

3. Cartons:

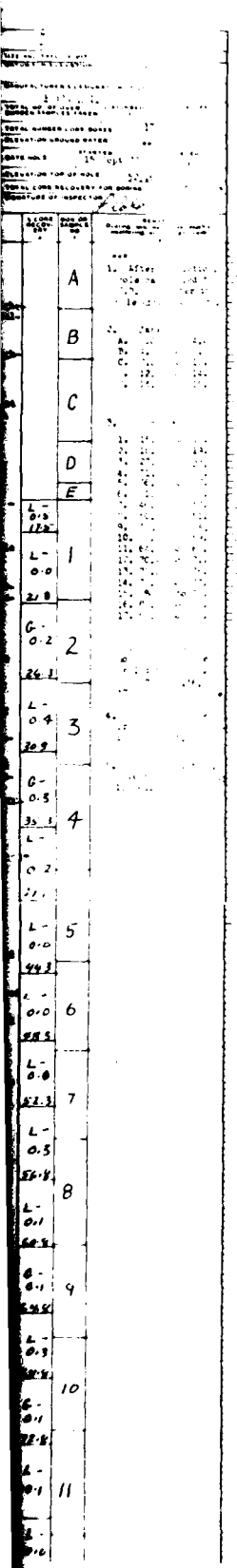
1.	1[illegible] to 1[illegible]
2.	18.[illegible] to 19.
3.	27. to 28.
4.	31.[illegible] to [illegible]
5.	36.[illegible] to 37.[illegible]
6.	[illegible]
7.	46.[illegible] to 47.
8.	50. to 51.
9.	[illegible] to [illegible]
10.	[illegible] to 69.
11.	64.[illegible] to [illegible]
12.	70.[illegible] to 71.
13.	7[illegible] to 76.[illegible]
14.	7[illegible] to 7[illegible]
15.	8[illegible] to [illegible]
16.	8[illegible] to [illegible]
17.	[illegible] to [illegible]

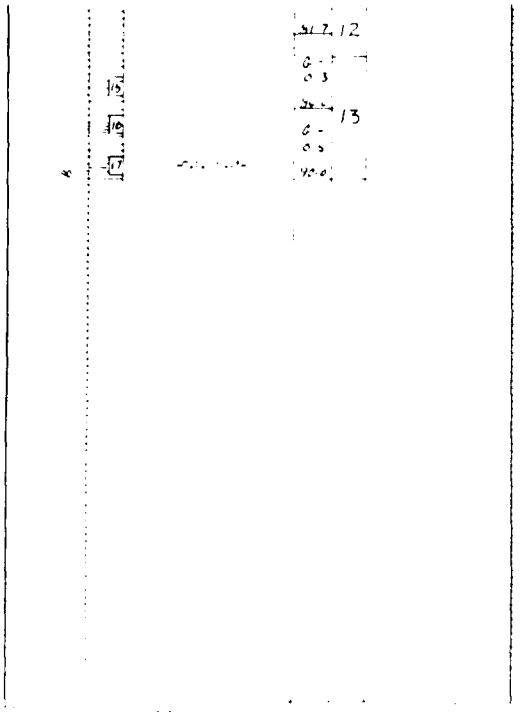
[illegible]

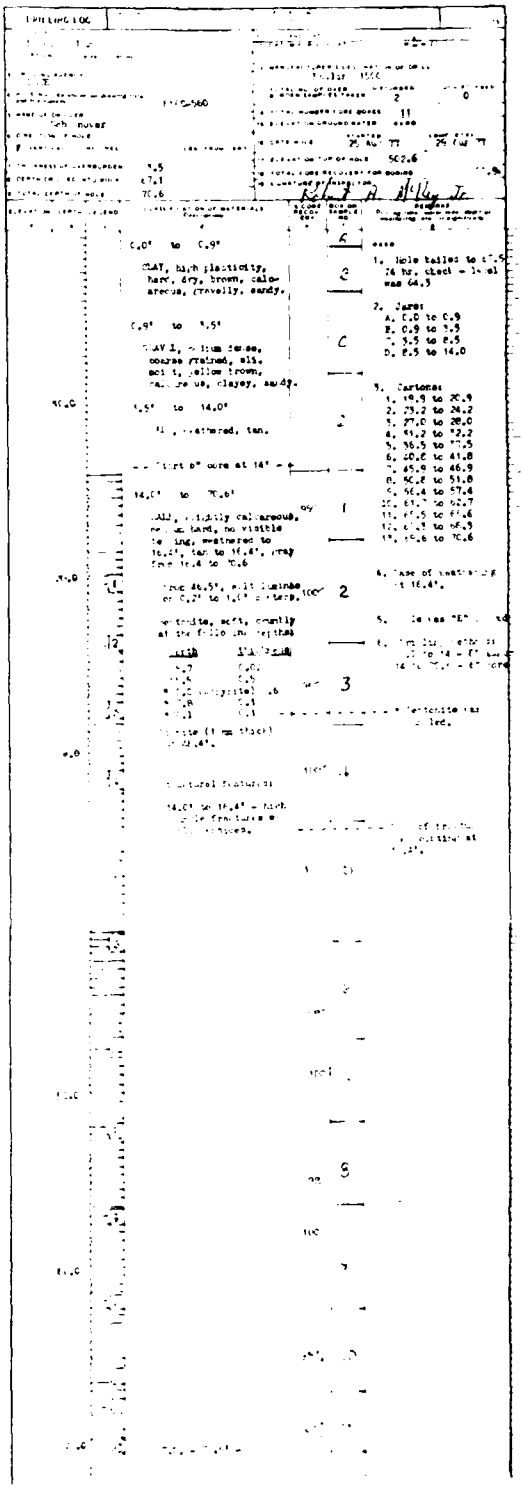
4. [illegible]

5. After [illegible], hole [illegible] logged.

1







U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY

DRAWN BY

CHECKED BY

SUBMITTED BY

ENGINEER

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS AND INITIAL EMBANKMENTS

LOGS OF BORINGS
SAGC-558, 559 AND 560

REV NO. | DATED

DRAWING NUMBER | SHEET NO. OF | SEQUENCE NO.

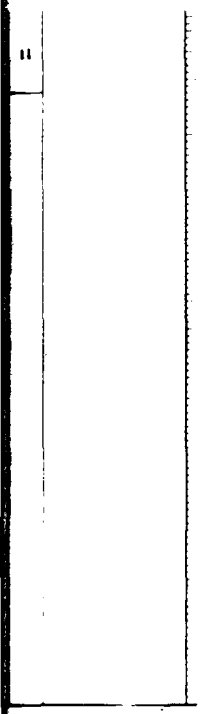
TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 21

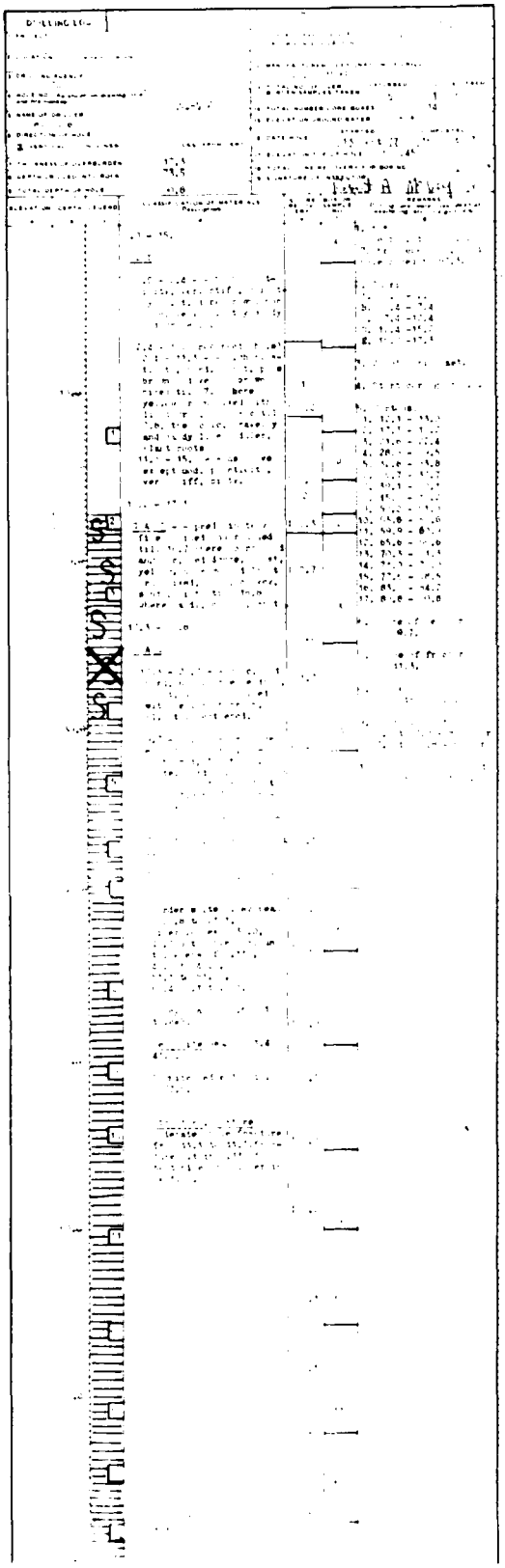
DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1

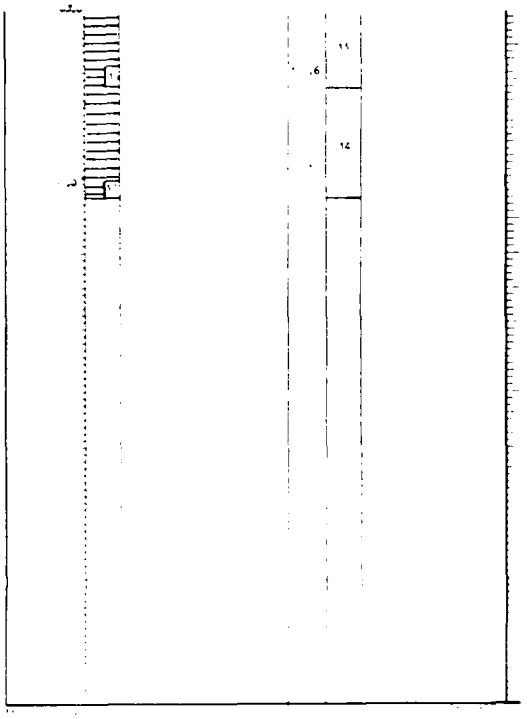
1. PROJECT	L[illegible] Dam
2. LOCATION (Coordinates or Station)	X 2153018 Y 356735
3. DRILLING AGENCY	USC[illegible]
4. HOLE NO. (As shown on drawing title and file number)	6/C-561
5. NAME OF DRILLER	[illegible]
6. DIRECTION OF HOLE	☒ VERTICAL ☐ INCLINED ___ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	14.0
8. DEPTH DRILLED INTO ROCK	71.2
9. TOTAL DEPTH OF HOLE	85.2
10. SIZE AND TYPE OF BIT	6" d.b., 6" core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 12 / UNDISTURBED 11
14. TOTAL NUMBER CORE BOXES	11
15. ELEVATION GROUND WATER	***
16. DATE HOLE	STARTED 1 Aug 77 / COMPLETED 5 Aug 77
17. ELEVATION TOP OF HOLE	518.68
18. TOTAL CORE RECOVERY FOR BORING	100 %
19. SIGNATURE OF INSPECTOR	H. Cob[illegible]

ELEVATION (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
			0.0' to 3.0' CLAY, high plasticity, hard, dry, brown to gray.		A	**** 1. After completion, hole was bailed to 85.5'. 72 hour check level was 85.5'.
			3.0' to 14.0' SAND, dense 3.0' to 4.5' - coarse to fine grained, moist, brown, sli. clayey, calcareous nodules, gravelly. 4.5' to 9.0' - medium to fine grained, dry, light brown, clayey, with decrease in clay from 6.0' to 9.0'. 9.0' to 14.0' - coarse to fine grained, slightly moist, brown, gravelly, clayey.		C1, C2, C3, C4, C5, C6, C7	2. Jars: A. 0.0 to 0.5 B. 0.5 to 2.0 C. @ 6.0 D. @ 8.0 E. @ 10.0 F. @ 12.0 G. @ 14.0 H. @ 16.0 I. @ 18.0 J. @ 20.0 K. @ 22.0 L. @ 24.0
	10.0					
			14.0' to 85.2' SHALE, slightly calcareous, medium hard, no visible bedding, weathered and tan to 28.8', gray from 28.8' to 85.2'.		C8, C9, C10, C11	3. Denison cans: 1. 2.0 to 4.0 2. 4.0 to 6.0 3. 6.0 to 8.0 4. 8.0 to 10.0 5. 10.0 to 12.0 6. 12.0 to 14.0 7. 14.0 to 16.0 8. 16.0 to 18.0 9. 18.0 to 20.0 10. 20.0 to 22.0 11. 22.0 to 24.0
	20.0			24.0		
			Structural features: 14.0' to 28.8' - highly fractured and jointed, iron-stained. 28.8' to 46.2' - fractures with well-formed slickensides at the following depths: depth / angle 30.3 / 45° 35 / 35–45° 38.2 / 35–45° 40.5 / 10° 45.7 / 45°	L 0.5 27.8 G 0.2 32.5 L 0.0 36.8 L 0.0 41.3	1 2 3	4. Cartons: 1. 25.1 to 25.9 2. 29.7 to 30.7 3. 32.2 to 33.2 4. 37.2 to 38.2 5. 41.7 to 42.7 6. 48.6 to 49.6 7. 56.2 to 57.2 8. 59.6 to 60.6 9. 64.0 to 65.0 10. 68.9 to 69.9 11. 72.8 to 73.8 12. 79.7 to 80.7 13. 83.7 to 84.7 5. Base of weathering at 28.8'. 6. Hole was "E" logged after completion.
	30.0		Structural features cont'd. 28.8' to 73.8' - apparent dip of 10°	L 0.2 45.8 G 0.2 48.8 G 0.1 53.8 L 0.4 57.7 L 0.8 62.2 G 1.1 66.7 L 0.1 70.2 L 0.1 74.2 G 0.4 78.7	4 5 6 7 8 9 10	7. Drilling methods: 0.0 to 2.0 - auger 2.0 to 24.0 - 6" d.b. 24.0 to 85.2 - 6" core

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS
			T.D. - 85.2' -	L 0.5 84.7	11	







U S ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY

DRAWN BY

CHECKED BY

SUBMITTED BY

ENGINEER

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS AND INITIAL EMBANKMENTS

LOGS OF BORINGS
6DC-561 AND 8A8C-562

DATED

DRAWING NUMBER

SHEET NO

OF

SEQUENCE NO

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 22

DRILLING LOG

1. Project	[illegible]
2. Location (Coordinates or Station)	[illegible]
3. Drilling Agency	L 26
4. Hole No. (As shown on drawing title and file number)	8460-563
5. Name of Driller	Fox[illegible]
6. Direction of Hole	☐ Vertical ☐ Inclined ___ Deg. from Vert.
7. Thickness of Overburden	11.5
8. Depth Drilled into Rock	79.3
9. Total Depth of Hole	90.8
10. Size and Type of Bit	[illegible]
11. Datum for Elevation Shown (TBM or MSL)	[illegible]
12. Manufacturer's Designation of Drill	Failing 1500
13. Total No. of Over-burden Samples Taken	Disturbed: 5 / Undisturbed: --
14. Total Number Core Boxes	10
15. Elevation Ground Water	[illegible]
16. Date Hole	Started: 1 Sept 77 / Completed: 12 Sept 77
17. Elevation Top of Hole	511.90
18. Total Core Recovery for Boring	100 %
19. Signature of Inspector	[signature] A. McVey Jr.

Elevation (a)	Depth (b)	Legend (c)	Classification of Materials (Description) (d)	% Core Recovery (e)	Box or Sample No. (f)	Remarks (Drilling time, water loss, depth of weathering, etc., if significant) (g)
	10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0	1–14	See text below	L 0.7, G 0.2, L 0.2, G 0.1, [illegible] 0.4, [illegible].1, L 0.0, G 0.1, L 0.3, G 0.2, L 0.0, G [illegible].1, L 0.0, L 0.0	A, B, C, D, E, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10	See text below

Classification of Materials:

0.0 - 8.4

CLAY

0.0 - 1.6 - - high plasticity, very stiff, to hard, dry, dark reddish brown, calc, silty.

1.6 - 3.1 - - as above, but grades to a [illegible]inally becomes reddish brown in color and moist.

3.1 - 5.2 - - as above except yellowish red, non calc.

5.2 - 8.4 - - high plasticity, very stiff, moist, reddish yellow, calc, silty, slightly gravelly and sandy from 7.0 to 8.4.

8.4 - 11.5

[illegible] - - coarse and fine grained, red [illegible], moist, brown, calc, clayey, [illegible], silty.

11.5 - 90.8

[illegible] - - calc, med hard, no visible bedding, moist, yellowish brown till base of weathered zone [illegible] 11.8, then dark [illegible], slightly fossiliferous, [illegible] thick white, hard veins throughout section frequently occurring [illegible] 3 per foot.

[illegible] lightly softer dark gray seam from 16.2 to [illegible].5([illegible]).

Harder white lime seams 18.7, 23.0, 2[illegible].5 - [illegible]5.9 (0.1' thick unless otherwise noted).

[illegible] 31.[illegible], 53.4 ([illegible]).

Bentonite seam from 29.3 to 29.8(no sample-too crumbly).

[illegible] feature [illegible]:

[illegible] angle fractures [illegible] 23.4 - [illegible]1.8, 25.0 - 25.5 (a series of fractures - slightly healed and terminating downward into harder lime seam) (odd), 26.0 - 26.[illegible](w/slicks), 2[illegible].7 - 29.1(w/slicks), 29.3 - 29.7(w/slicks on the shale of [illegible] shale-bentonite contact. [illegible] above the bentonite [illegible]. The bentonite is itself fractured and often filled with selinite veins up to 5mm thick.

[illegible] shale after 68.6.

Fishtail 70.8 - 90.0.

Remarks:

1. [illegible] Hole bailed to 68.[illegible]. 24 hr check [illegible] 64.4 and hole caved to 67.7.
2. Jars:
   A. 0.0 - 1.6
   B. 1.6 - 3.1
   C. 3.1 - 5.2
   D. 5.2 - 8.4
   E. 8.4 - 11.5
3. 12.0' casing set.
4. Cartons:
   1. 13.1 - 14.1
   2. 15.7 - 16.7
   3. 20.0 - 21.0
   4. 24.9 - 25.9
   5. 30. - 31.4
   6. 34.2 - 35.2
   7. 38.6 - 39.6
   8. 43.6 - 44.
   9. 46.8 - 47.8
   10. 50.9 - 51.9
   11. 55.9 - 56.9
   12. 60.2 - [illegible]1.2
   13. 6[illegible].8 - 65.8
   14. 69.C - 70.8
5. Base of [illegible] 11.8.
6. Base of fracturing [illegible] 29.7.
7. Only bentonite [illegible] too crumbly for [illegible]tion.
8. Drilling methods: 0.0 to 12.0 - 8 [illegible], 12.0 to 70.8 - 6[illegible] core, 70.8 to 90.8 - 4 [illegible] fishtail (for better log correlations).
9. Hole [illegible] logged after completion

ENG FORM 1836

DRILLING LOG

1. Project	LAKEVIEW LAKE
2. Location (Coordinates or Station)	X 2156008 Y 357015
3. Drilling Agency	LMK-G
4. Hole No. (As shown on drawing title and file number)	GDC 568
5. Name of Driller	M NEWHOUSE
6. Direction of Hole	☒ Vertical ☐ Inclined ___ Deg. from Vert.
7. Thickness of Overburden	18.0'±
8. Depth Drilled into Rock	57.0'±
9. Total Depth of Hole	75.0
10. Size and Type of Bit	[illegible]
11. Datum for Elevation Shown (TBM or MSL)	[illegible]
12. Manufacturer's Designation of Drill	FAILING 2500
13. Total No. of Over-burden Samples Taken	Disturbed: 9 / Undisturbed: 9
14. Total Number Core Boxes	10
15. Elevation Ground Water	See Remarks Column
16. Date Hole	Started: 26 July 77 / Completed: 29 July 77
17. Elevation Top of Hole	518.79
18. Total Core Recovery for Boring	9[illegible] %
19. Signature of Inspector	[signature]

Elevation (a)	Depth (b)	Legend (c)	Classification of Materials (Description) (d)	% Core Recovery (e)	Box or Sample No. (f)	Remarks (g)
518.79	0.0		0.0' to 18.0'± CLAY		A; DB 1 (4 5/8); DB 2 (4 5/8); DB 3 (4 5/8); DB 4 (4 5/8); DB 5 (4 5/8); DB 6 (4 5/8); DB 7 (4 5/8); DB 8 (4 5/8); DB 9 (4 5/8); DB 10 (4 5/8)	
500.79	18.0	1–10	18.0'± to 75.0 TD SHALE	21.0; L 0.3; 24.0; L 0.2; 29.3; L 0.0; 33.0; G 0.1; 35.0; G 0.1; 40.1; G 0.2; 44.8; L 0.2; 49.5; L 0.3; 54.5; L 0.3; 59.3; G 0.0; 63.8; L 0.5; 66.8; L 0.0; 70.0; G 0.1; 75.0	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
443.79	75.0					

Classification of Materials:

0.0' TO 18.0'±

CLAY:

0.0 - 3.0'± MED - HIGH PLASTICITY, DARK GRAY BLACK, HARD, DRY - DAMP, CALC

3.0'± - 5.0'± MED - HIGH PLASTICITY, DARK BROWN, HARD, DAMP, CALC

5.0'± - 9.0'± MED - HIGH PLASTICITY, YELLOW BROWN & LIGHT GRAY, HARD, DAMP, CALC

9.0'± - 16.0'± MEDIUM TO LOW PLASTICITY AT 15.0'±, YELLOW BROWN, HARD, DAMP, TRACE OF SILT & FINE SAND TO SANDY AT 15.0'±

16.0'± - 16.5'± LOW - MED PLASTICITY, BROWN, STIFF - VERY STIFF, MOIST, WITH ABUNDANT FINE LIME GRAVEL

16.5'± - 18.0'± LOW PLASTICITY, BROWN, HARD, DRY, SANDY, CALC, WITH EMBEDDED GRAVEL

18.0'± TO 75.0 TD

SHALE:

18.0'± - 21.7' SLIGHTLY MOD WEATHERED, YELLOW BROWN & GRAY, SOFT - MOD SOFT, WITH SOME FRACTURES & SLICKS, SLIGHTLY CALC, WITH NO VISIBLE BEDDING

20.0 - 21.0 VERY HARD CEMENTED SILTSTONE

21.7 - 75.0' SHALE, DARK GRAY, SLIGHTLY CALC, POORLY BEDDED, WITH SOME THIN WHITE LIMY LAMINATIONS

21.7' BASE OF FRACTURING

27.0 - 28.0 HARD LIGHT GRAY SILTSTONE

29.4 - 29.8 45° SLICK

33.4 - 34.0 LIGHT GRAY SILTSTONE [illegible]

37.0 - 37.4' 45° SLICK

53.1 - 53.3 LIGHT BROWN SILTSTONE CONCRETION

55.9' - 56.6 LIGHT BROWN SILTSTONE CONCRETION

61.7 - 62.0' LIGHT BROWN SILTSTONE CONCRETION

Remarks:

1. BORING BAILED TO 67.0' ON 4 AUG 77 & LEFT OPEN

   BORING HAD CLOSED IN AT 8.0' & COULD CHECK WATER LEVEL ON 5 AUG 77

2. JAR SAMPLES
   A 0.0 - 2.0
   B 4.0
   C 6.0
   D 8.0
   E 10.0
   F 12.0
   G 14.0
   H 16.0
   I 17.0
   J 19.0
   K 21.0

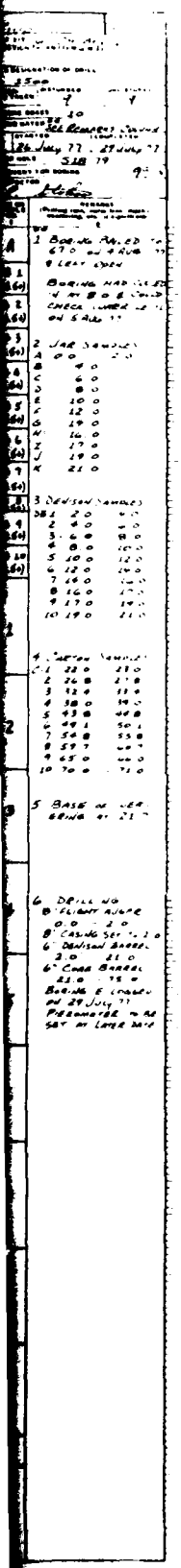
3. DENISON SAMPLES
   DB 1 2.0 - 4.0
   2 4.0 - 6.0
   3 6.0 - 8.0
   4 8.0 - 10.0
   5 10.0 - 12.0
   6 12.0 - 14.0
   7 14.0 - 16.0
   8 16.0 - 17.0
   9 17.0 - 19.0
   10 19.0 - 21.0

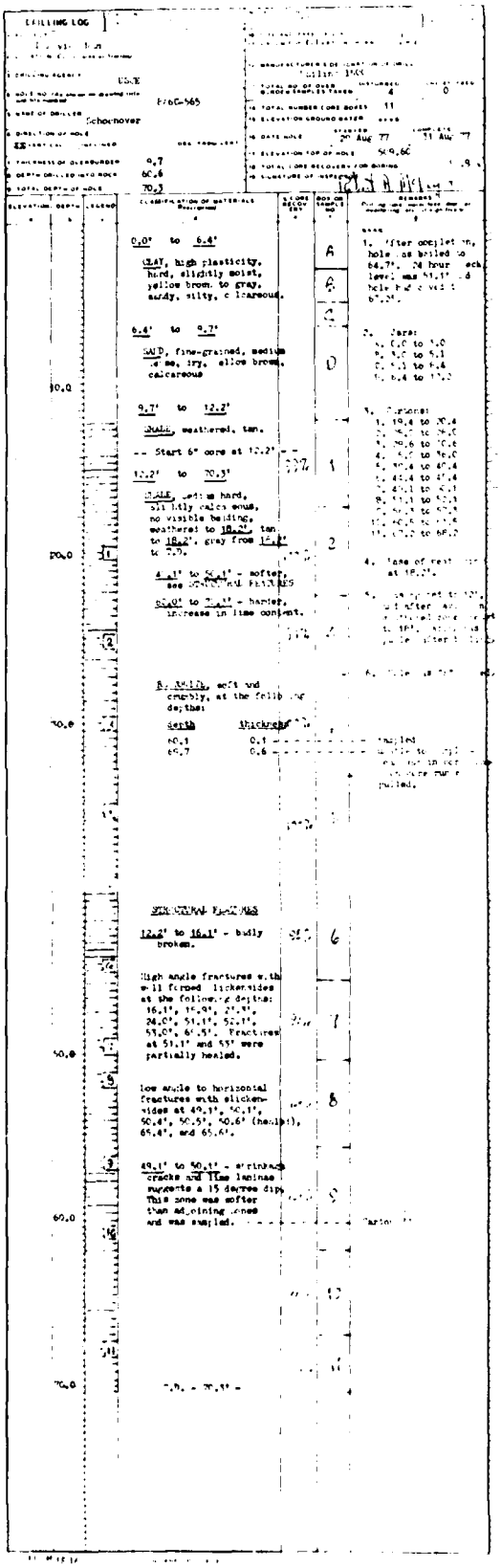
4. CARTON SAMPLES
   C-1 22.0 - 23.0
   2 26.0 - 27.0
   3 32.4 - 33.4
   4 38.0 - 39.0
   5 43.0 - 44.0
   6 49.1 - 50.1
   7 54.0 - 55.0
   8 59.7 - 60.7
   9 65.0 - 66.0
   10 70.0 - 71.0

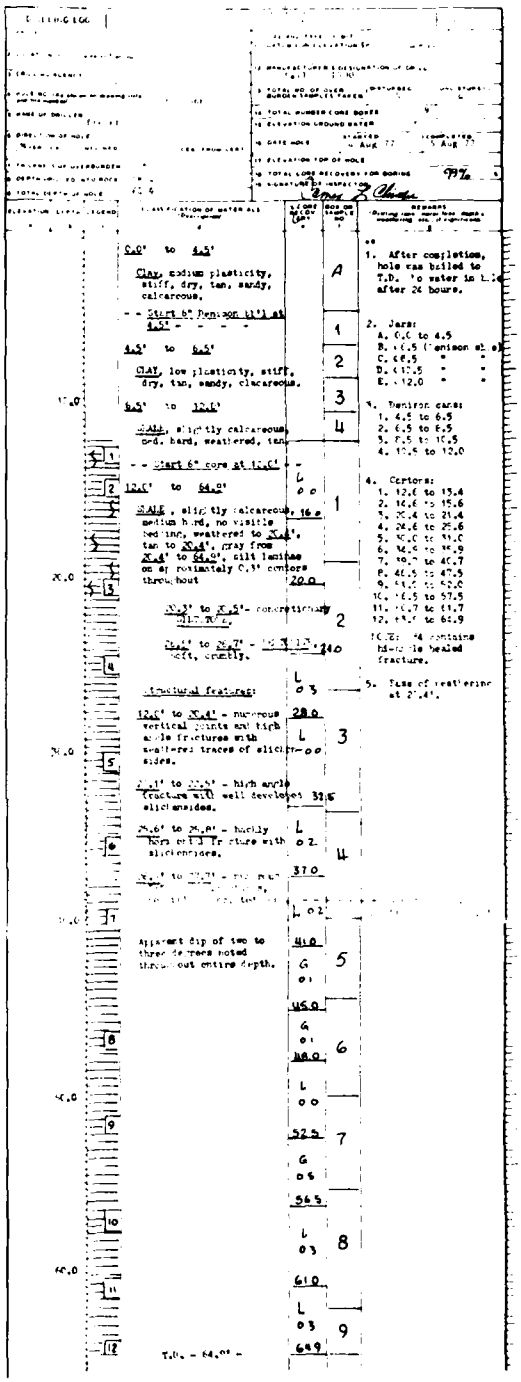
5. BASE OF WEATHERING AT 21.7

6. DRILLING
   8" FLIGHT AUGER 0.0 - 2.0
   8" CASING SET TO 2.0
   6" DENISON BARREL 2.0 - 21.0
   6" CORE BARREL 21.0 - 75.0
   BORING E-LOGGED ON 29 JULY 77.
   PIEZOMETER TO BE SET AT LATER DATE

ENG FORM 1836







		U S ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS
DESIGNED BY		JOE POOL LAKE MOUNTAIN CREEK, TEXAS
DRAWN BY		OUTLET WORKS AND INITIAL EMBANKMENTS
CHECKED BY		LOGS OF BORINGS 8A6C-563, 6DC-564, 8A6C-565 AND 6DC-566
SUBMITTED BY		IRV NO
ENGINEER		DATED
		DRAWING NUMBER / SHEET NO

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 23

DRILLING LOG

HOLE NO.: BAGC-567
NAME OF DRILLER: [illegible]
MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: 3
TOTAL NUMBER CORE BOXES: 10
THICKNESS OF OVERBURDEN: 9.2
DEPTH DRILLED INTO ROCK: 55.8
TOTAL DEPTH OF HOLE: 65.0
DATE HOLE: STARTED 1 Sept 77 — COMPLETED 6 Sept 77
ELEVATION TOP OF HOLE: 503.30
TOTAL CORE RECOVERY FOR BORING: 99.6 %
SIGNATURE OF INSPECTOR: [signature]

CLASSIFICATION OF MATERIALS

0.0 – 1.1

CLAY – – high plasticity, very stiff, moist, dark brown, calc, sandy, slightly gravelly after 0.8.

1.1 – 9.2

GRAVEL

1.1 – 5.1 – – coarse grained lime nodules, med dense, moist, brown, calc, clayey, sandy.
5.1 9.2 – – as above except color is [illegible] brown

9.2 – 65.0

SHALE

9.2 – 16.7 – – calc, and hard, no visible bedding, moist, yellowish brown, carbonaceous, highly jointed, weathered.

16.7 – 65.0 – – as above except dark gray, unweathered, thin (1mm) white lime veins throughout section, slightly fossiliferous.

Hard pale brown lime seams at 23.7, 30.7, and 35.5 (all 0.1' thick).

Structural features:

Vertical fracture (stained) from 17.1 to 19.6.

White lime veins locally oriented up to 9 degrees dip from 34.1 to 35.0.

Harder lime shale after 60.5.

% Core recovery: 10.8, [illegible] 0.4, [illegible] 0.3, [illegible] 0.5, [illegible] 0.0, [illegible] 0.3, [illegible] 0.0, [illegible] 0.3, [illegible] 0.[illegible], [illegible] 0.5

Box or sample no.: A, B, C, D, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

REMARKS

1. ... Hole bailed to [illegible]. 24 hr check [illegible] hole caved to 52.5.
2. Jars:
   A. 0.0 – 1.1
   B. 1.1 – 5.1
   C. 5.1 – 9.2
   D. 9.2 – 11.0
3. 12.0 casing set.
4. Cartons:
   1. 11.6 – 12.4
   2. 19.9 – 20.9
   3. 24.4 – 25.4
   4. 30.0 – 31.0
   5. 36.3 – 37.3
   6. 41.0 – 42.0
   7. 44.1 – 45.1
   8. 49.3 – 50.3
   9. 53.2 – 51.2
   10. 59.8 – 60.8
   11. 63.7 – 64.7
5. Too crumbly for a [illegible] sample from 12.4 to 19.9.
6. Base of weathering at 16.7.
7. Base of fracturing at 19.6 (also base of staining).
8. Drilling method: 0.0 – 11.0 – – [illegible] 11.0 – 65.0 – – [illegible] core

---

DRILLING LOG

PROJECT: [illegible]
LOCATION: X: 2154590 Y: 353315
DRILLING AGENCY: USCE-C
HOLE NO.: BAGC-568
NAME OF DRILLER: A. BREWER
DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500
TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 2, UNDISTURBED 0
TOTAL NUMBER CORE BOXES: 9
ELEVATION GROUND WATER: SEE REMARKS COLUMN
DATE HOLE: STARTED 1 AUG 77 — COMPLETED 2 AUG 77
ELEVATION TOP OF HOLE: 598.85'
TOTAL CORE RECOVERY FOR BORING: 94 %
THICKNESS OF OVERBURDEN: 2.5
DEPTH DRILLED INTO ROCK: 52.5
TOTAL DEPTH OF HOLE: 55.0'
SIGNATURE OF INSPECTOR: [signature]

Elevation: 598.85 (depth 0.0); 558.85; 543.85 (depth 55.0)

CLASSIFICATION OF MATERIALS

0.0' TO 2.5

CLAY MED - HIGH PLASTICITY, BROWN WITH YELLOW BROWN, HARD, DAMP, SLIGHTLY CALC

2.5 TO 55.0' TD

SHALE:

2.5'-14.2 HIGHLY WEATHERED, YELLOW BROWN & GRAY, SOFT-MED SOFT, HIGHLY FRACTURED, [illegible] [illegible]-CALC, [illegible]

6.6'-6.9' VERY HARD LIMY SILTSTONE, WELL CEMENTED, LIGHT GRAY & [illegible]

11.4'-11.8' 45° TIGHT STAINED FRACTURE

12.6'-13.0' 45° SLICK

14.2'-55.0' UNWEATHERED, MEDIUM GRAY, SLIGHTLY CALC, POORLY BEDDED, WITH [illegible] THIN WHITE LIMY LAMINATIONS EVERY 3" TO 6".

15.2'-17.1 TWO VERTICAL STAINED TIGHT FRACTURES

17.1 BASE OF FRACTURING

18.6'-18.9' MED HARD LIGHT BROWN SILTSTONE

19.0'-19.1 MED HARD LIGHT BROWN SILTSTONE

22.9'-23.3 60° SLICK

23.6 HARD LIGHT BROWN SILTSTONE CONCRETION

31.9 LIGHT GRAY SILTSTONE CONCRETION

33.2 "

35.9 "

49.5'-55.0' MARLY, HARD

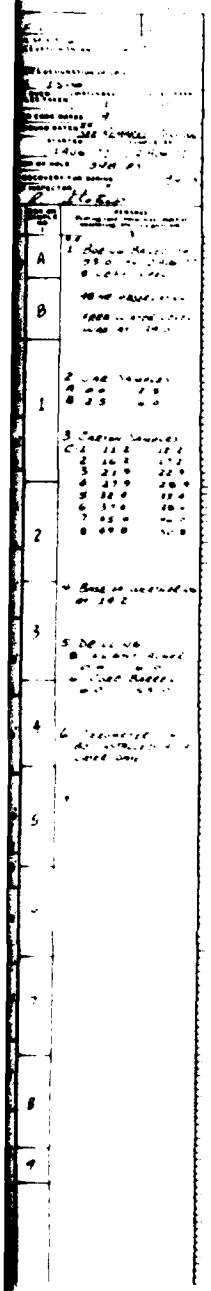
TD 55.0'

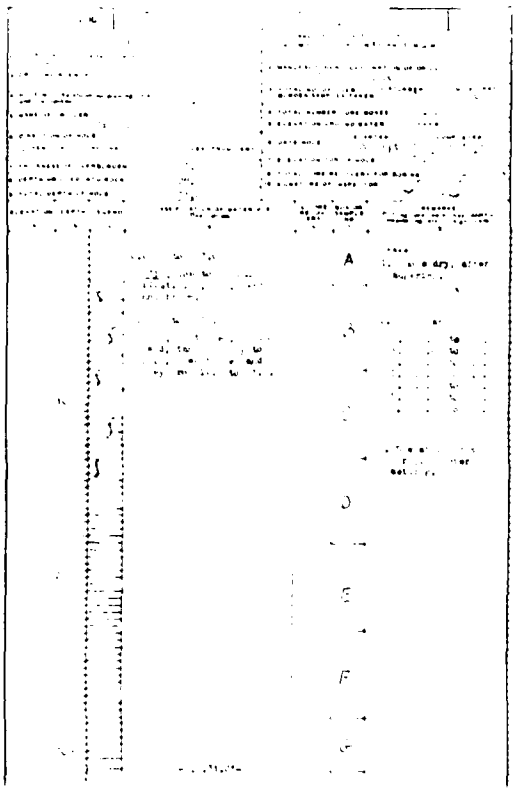
% Core recovery / depth: 6.0, 1.30, 10.5, 6.02, 13.6, 1.00, 18.0, 6.03, 22.0, 6.0, 26.5, 1.00, 31.0, 1.00, 35.5, 6.03, 37.5, [illegible], 42.0, 1.00, 44.4, 1.03, 50.5, 6.03, 55.0

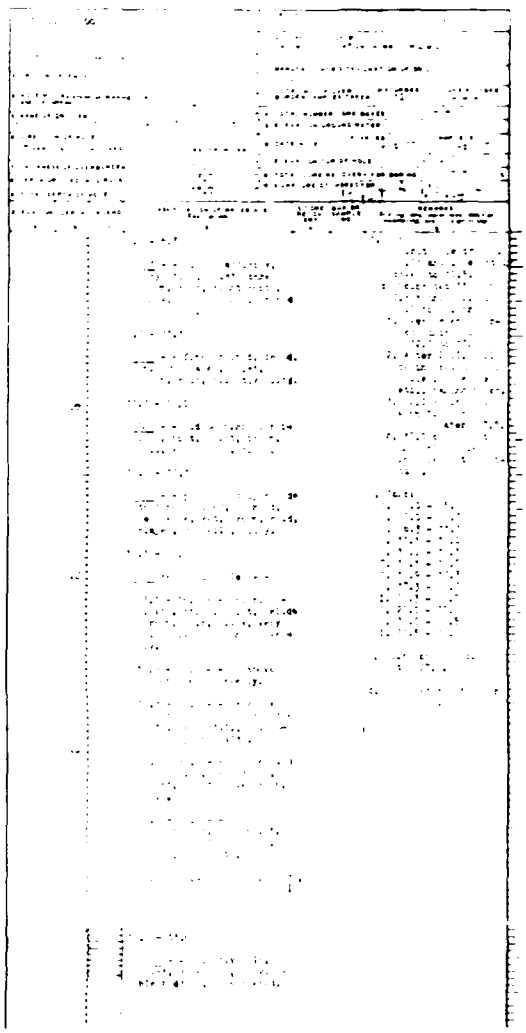
Box or sample no.: A, B, 1, 2, 3, 4, 5, 6, 7, 8, 9

REMARKS

1. BORING BAILED TO 53.0' ON 2 AUG 77 & LEFT OPEN
   48 HR OBSERVATION
   FREE WATER LEVEL WAS AT 39.0
2. JAR SAMPLES:
   A 0.0 - 2.5
   B 2.5 - 6.0'
3. CARTON SAMPLES:
   C-1 11.2' - 12.2
   2 16.2' - 17.2
   3 21.9' - 22.9
   4 27.9' - 28.9'
   5 32.4' - 33.4
   6 37.4' - 38.4
   7 45.0 - 46.0
   8 49.8 - 50.8
4. BASE OF WEATHERING AT 14.2'
5. DRILLING:
   8" FLIGHT AUGER 0.0 - 6.0
   6" CORE BARREL 6.0 - 55.0'
6. PIEZOMETER TO BE INSTALLED AT A LATER DATE







U S ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
ENGINEER

JOE POOL LAKE
MOUNTAIN CREEK, TEXAS

OUTLET WORKS AND INITIAL EMBANKMENTS

LOGS OF BORINGS
BA6C-567, 568 AND BA-569, 570

REV NO
DATED
DRAWING NUMBER
SHEET NO
OF
SEQUENCE NO

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 24

DRILLING LOG

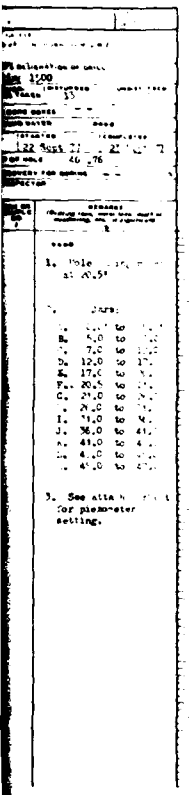
Location	[illegible] Y-2...
Hole No.	8A-572
Name of Driller	Brewer
Direction of Hole	☒ Vertical ☐ Inclined
Thickness of Overburden	37.0
Depth Drilled into Rock	2.0
Total Depth of Hole	39.0
Manufacturer's Designation of Drill	Failing 1500
Total No. of Over-burden Samples Taken	Disturbed: 12 · Undisturbed: 0
Total Number Core Boxes	--
Date Hole	Started: 21 Sept 77 · Completed: 21 Sept
Signature of Inspector	[signature]

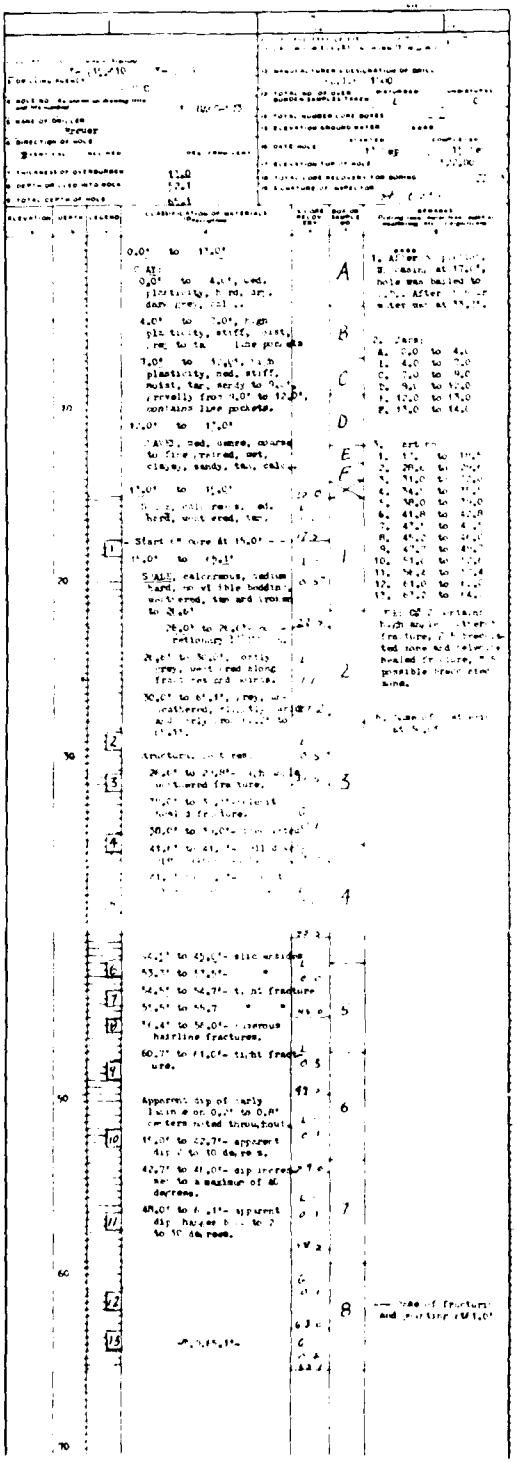
Elevation	Depth	Legend	Classification of Materials (Description)	% Core Recovery	Box or Sample No.	Remarks
			0.0' to 36.0'		A	****
			CLAY:		B	1. Water coming into hole at 17.0'.
			0.0' to 4.5', med. plasticity, stiff, dry, dark grey.		C	2. Jars:
			4.5' to 12.5', high plasticity, stiff, moist w/ lime pockets from 7.5' to 12.5', tan.		D	A. 0.0 to 2. ; B. 2.5 to 4.5 ; C. 4.5 to 7.5 ; D. 7.5 to 12. ; E. 12.5 to 18.0 ; F. 18.0 to 23.0 ; G. 23.0 to 23.5 ; H. 23.5 to 28.5 ; I. 28.5 to 33.5 ; J. 33.5 to 36.0 ; K. 36.0 to 37.0 ; L. 37.0 to 39.0
	10		12.5' to 36.0', high plasticity, stiff, moist to wet, gravelly from 23.0' to 23.5', tan.		E	3. See attached sheet for piezometer installation.
			36.0' to 37.0'		F	4. All samples calcareous.
	20		GRAVEL, sed. dense, coarse to fine grained, wet, tan, clayey.	G	H	
			37.0' to 39.0'		I	
	30		SHALE, med. hard, calcareous.		J	
			-T.D. 39.0'-		K	

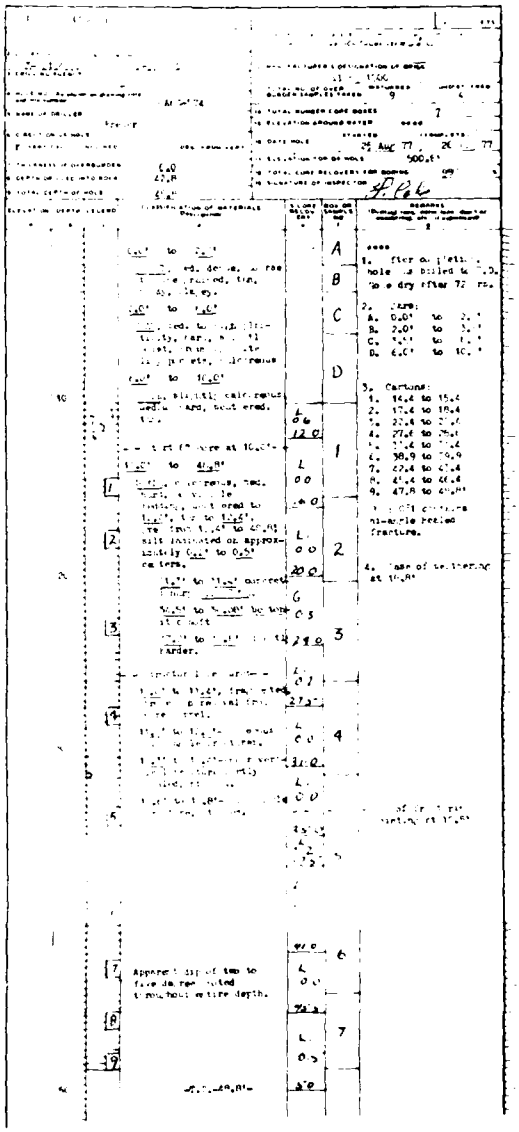
DRILLING LOG

Location	Y-21½,... Y-...
Drilling Agency	U... E
Hole No.	8A572
Name of Driller	Brewer
Direction of Hole	☒ Vertical ☐ Inclined
Thickness of Overburden	45.0
Depth Drilled into Rock	2.0
Total Depth of Hole	47.0
Manufacturer's Designation of Drill	Failing 1500
Total No. of Over-burden Samples Taken	Disturbed: 13
Total Number Core Boxes	--
Elevation Ground Water	****
Date Hole	Started: 22 Sept 77 · Completed: 22 Sept 77
Elevation Top of Hole	46..76
Total Core Recovery for Boring	--

Elevation	Depth	Legend	Classification of Materials (Description)	% Core Recovery	Box or Sample No.	Remarks
	0		0.0' to 45.0'			****
			CLAY:			1. Hole caving in at 20.5'
			0.0' to 7.0', moist, high plasticity, hard slightly moist, dark grey.			2. Jars:
			7.0' to 20.5', high plasticity, stiff, moist, tan, contains lime pockets from 12.0 to 17.0			A. 0.0' to 5.0 ; B. 5.0 to 7.0 ; C. 7.0 to 12.0 ; D. 12.0 to 17.0 ; E. 17.0 to 20.5 ; F. 20.5 to 21.0 ; G. 21.0 to 26.0 ; H. 26.0 to 31.0 ; I. 31.0 to 36.0 ; J. 36.0 to 41.0 ; K. 41.0 to 4[illegible] ; L. 4[illegible] to 4[illegible] ; M. 4[illegible].0 to 47.0
	10		20.5' to 21.0', high plasticity, stiff, wet, tan, gravelly and sandy.			3. See attached sheet for piezometer setting.
			21.0' to 43.0', high plasticity, very moist, tan, medium stiff from 31.0 to 43.0.			
			43.0' to 47.0', medium plasticity, very stiff, moist, grey and gravelly.			
	20		45.0' to 47.0'			
			SHALE, medium hard, dark grey, calcareous.			
	30		-T.D.-47.0'-			







DESIGNED BY	US ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS	
DRAWN BY	JOE POOL LAKE MOUNTAIN CREEK, TEXAS	
CHECKED BY	OUTLET WORKS AND INITIAL EMBANKMENTS	
SUBMITTED BY	LOGS OF BORINGS BA-571, 572 AND BAGC-573, 574	
ENGINEER	DRAWING NUMBER	SHEET NO OF

TO ACCOMPANY OUTLET WORKS FINAL FOUNDATION REPORT PLATE 28

Fig 13 Intake tower foundation. Station 18+70. 14 Feb 81

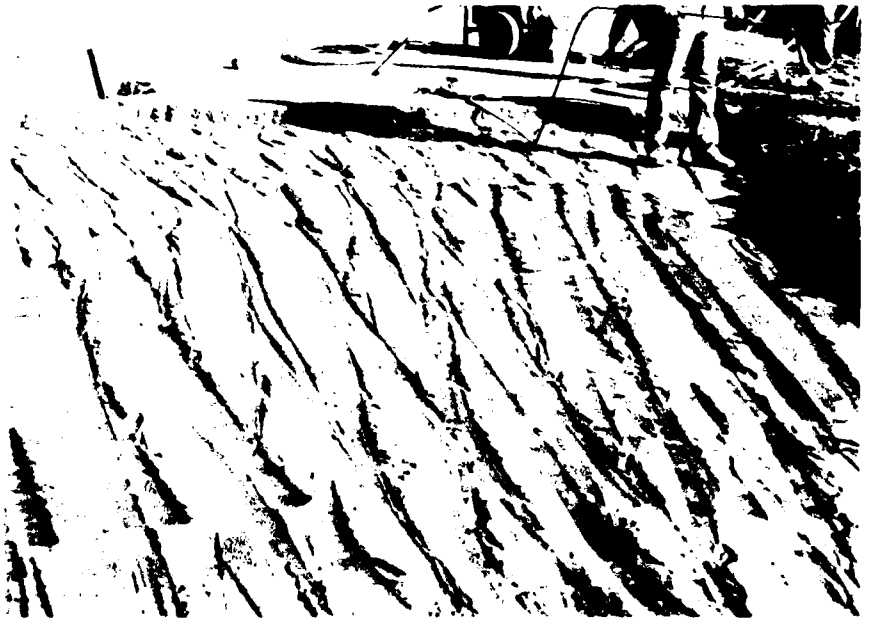
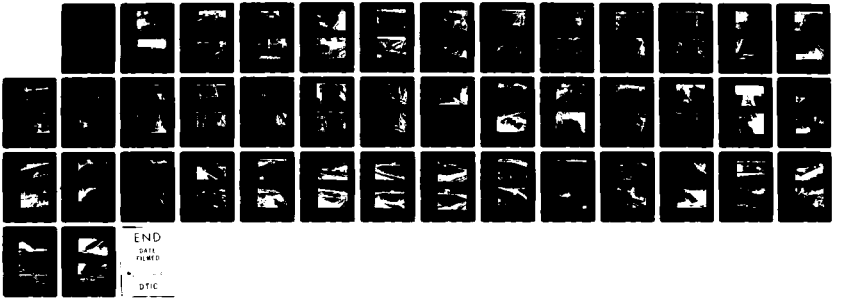


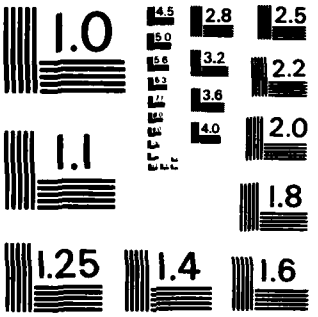
Fig 14 Intake tower foundation. Station 18+85. 14 Feb 81

AD-A133 180 OUTLET WORKS JOE POOL LAKE MOUNTAIN CREEK TEXAS(U) ARMY 3/2
ENGINEER DISTRICT FORT WORTH TX A J MARR JUN 83

UNCLASSIFIED F/G 13/13 NL



END
DATE FILMED
DTIC



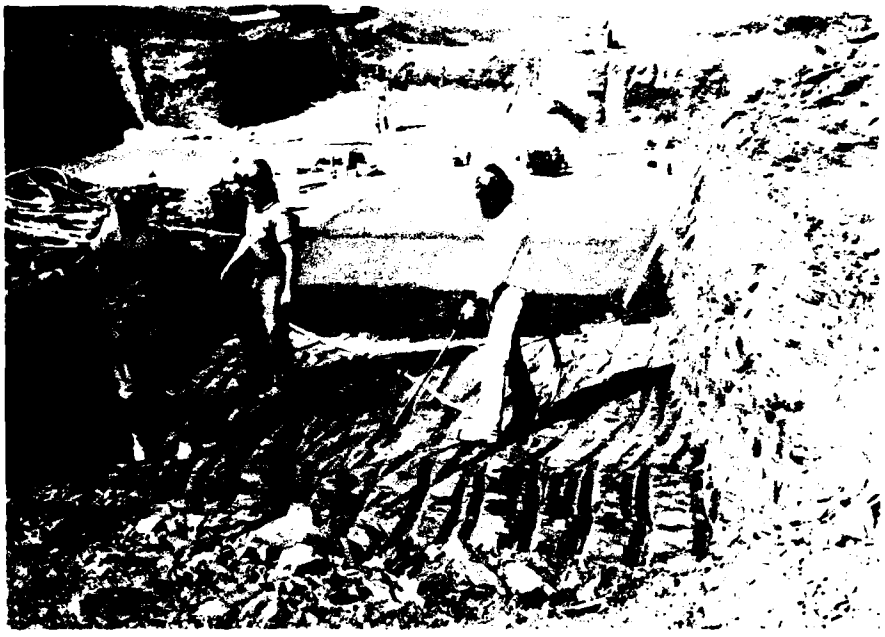


Fig 15 Intake tower foundation. Station 19+10. 7 Feb 81

Fig 16 Intake tower foundation. Station 19+75. 7 Feb 81

Fig 17 Intake tower foundation. Station 19+75. 6 Feb 81

Fig 18 Fault crossing intake tower foundation. Station 19+90
6 Feb 81

Fig 19 Intake tower foundation. Station 20+50. 4 Feb 81

Fig 20 Intake tower foundation. Station 19+80. 6 Feb 81

Fig 21 Conduit foundation. Station 20+48 - 20+68 - 16 Feb 81

Fig 22 Conduit foundation. Station 20+48 - 20+68 - 16 Feb 81

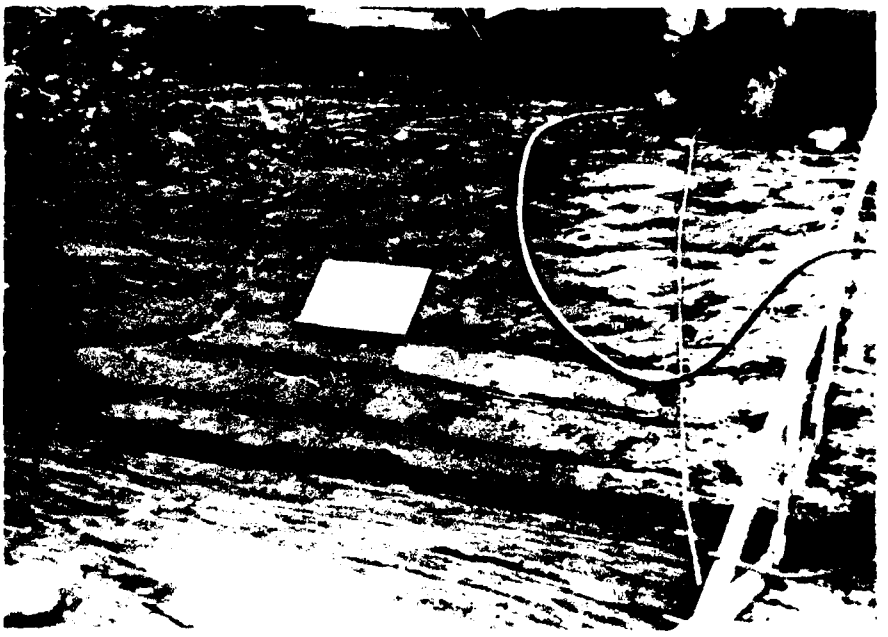


Fig 23 Conduit foundation. Station 20+68 - 20+88 - 18 Feb 81

Fig 24 Conduit foundation. Station 20+88 - 21+08 - 19 Feb 81

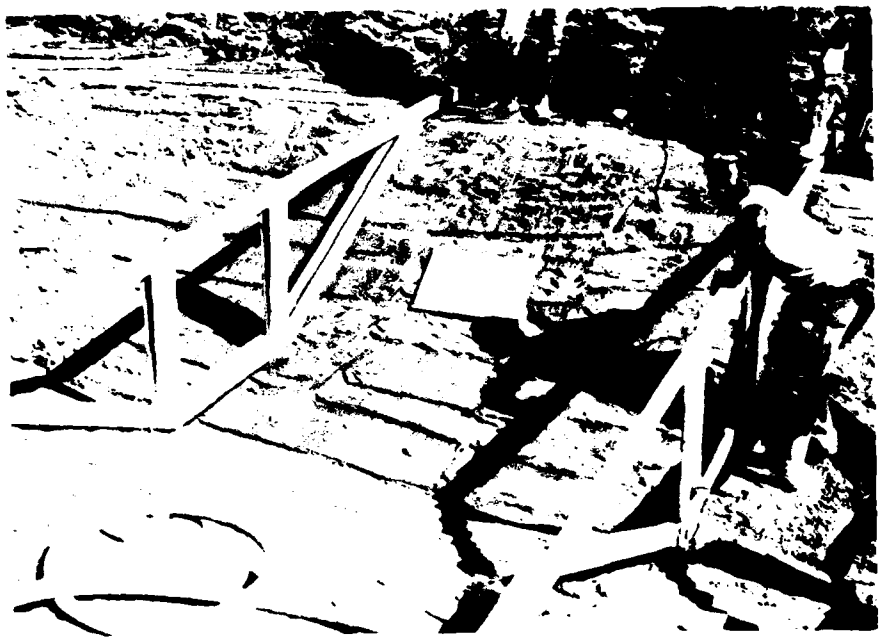


Fig 25 Conduit foundation. Station 21+08 - 21+28 - 19 Feb 81

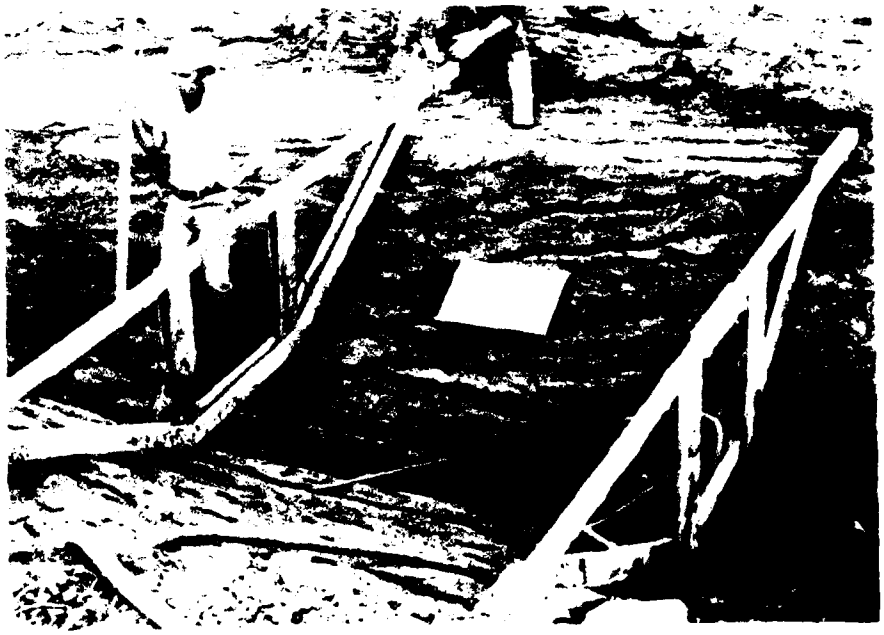


Fig 26 Conduit foundation. Station 21+28 - 21+48 - 19 Feb 81

Fig 27 Conduit foundation. Station 21+48 - 21+68 - 20 Feb 81

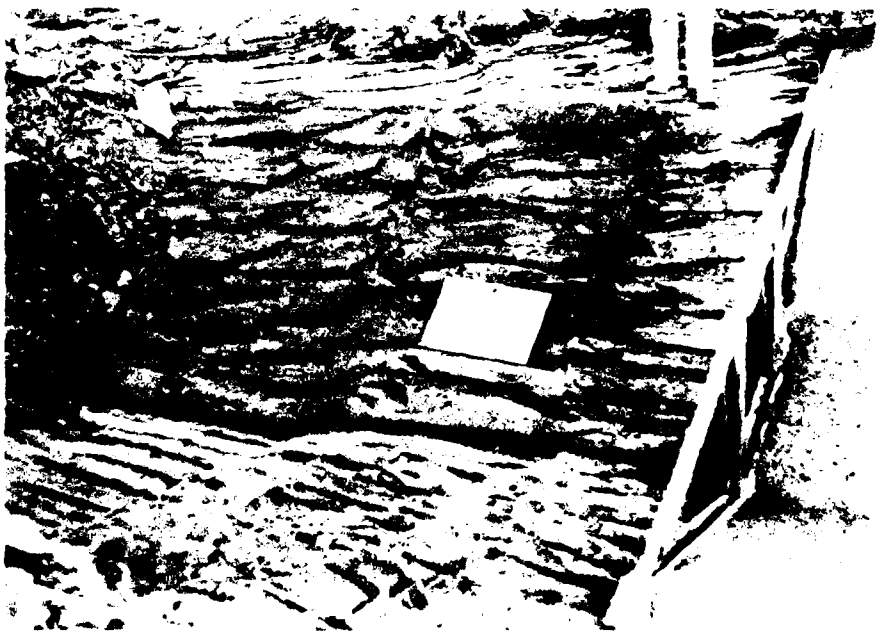


Fig 28 Conduit foundation. Station 21+68 - 21+88 - 20 Feb 81

Fig 29 Conduit foundation. Station 22+08 - 22+28 11 Mar 81

Fig 30 Conduit foundation. Station 22+28 - 22+48 11 Mar 81

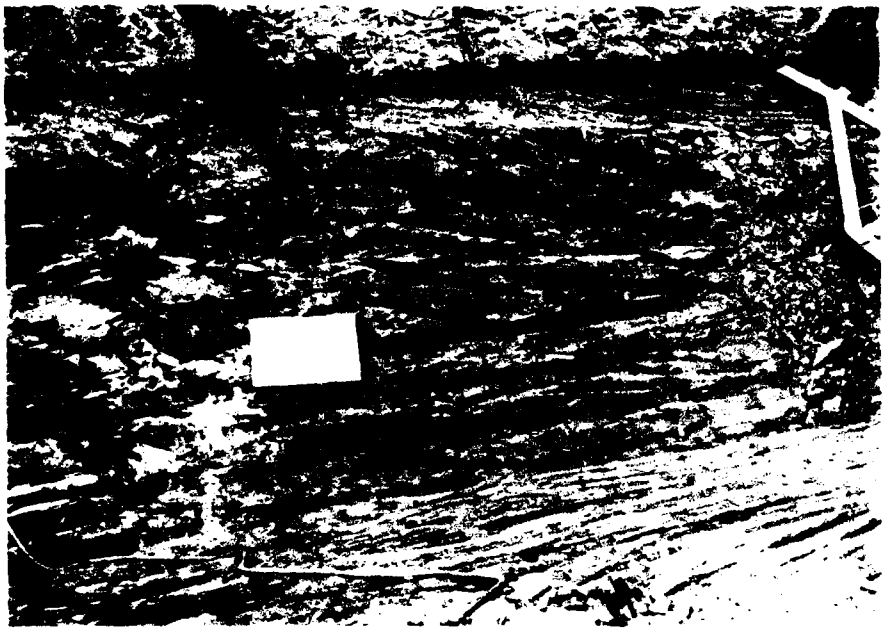


Fig 31 Conduit foundation. Station 22+48 - 22+68 13 Mar 81

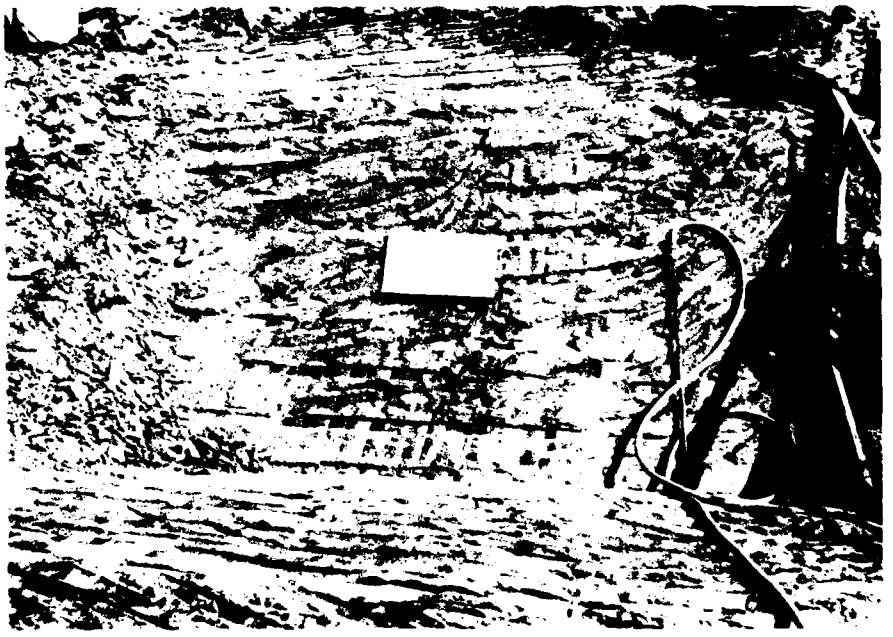


Fig 32 Conduit foundation. Station 22+68 - 22+88 13 Mar 81

Fig 33 Conduit foundation. Station 22+88 - 23+08 16 Mar 81

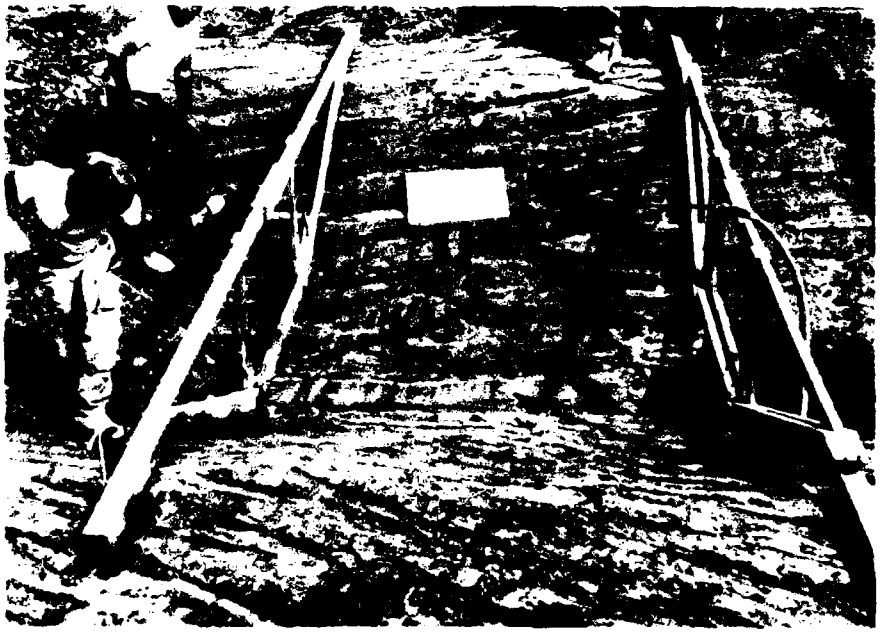


Fig 34 Conduit foundation. Station 23+08 - 23+28 16 Mar 81

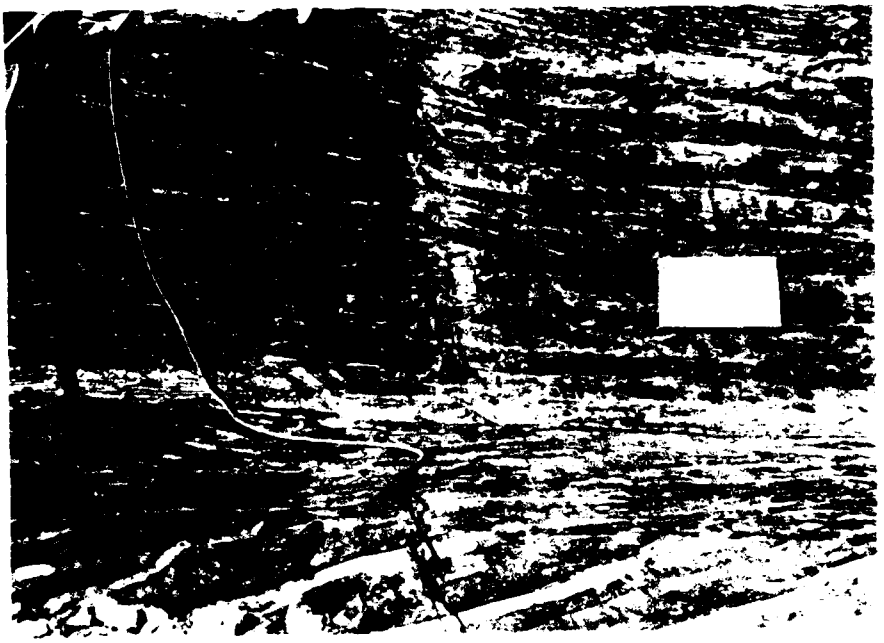


Fig 35 Conduit foundation. Station 23+28 - 23+48 19 Mar 81

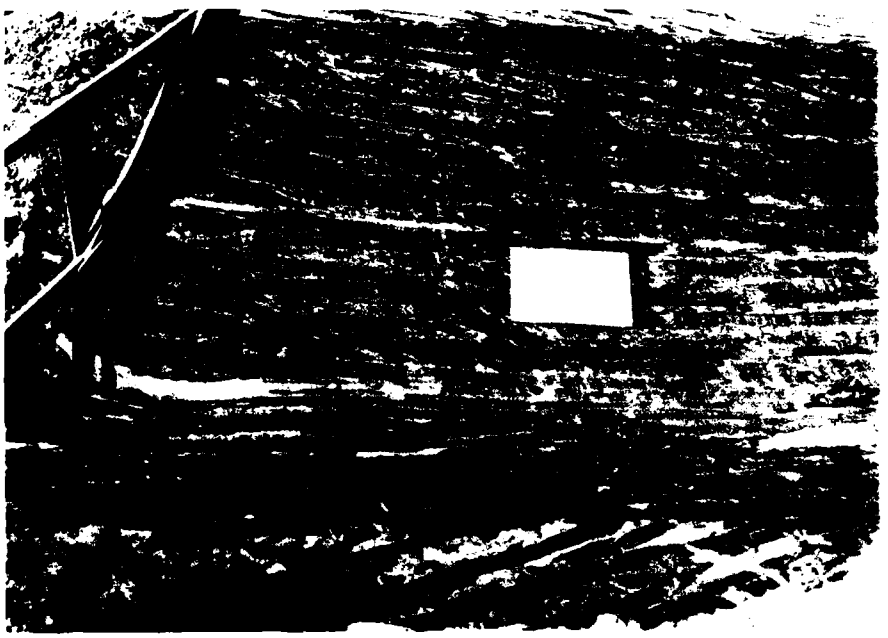


Fig 36 Conduit foundation. Station 23+48 - 23+68 23 Mar 81

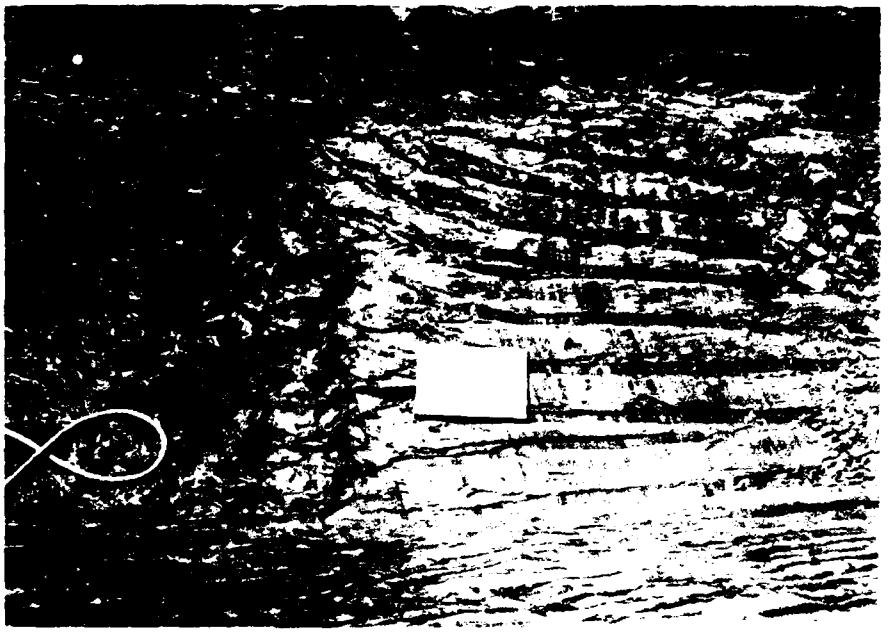


Fig 37 Conduit foundation. Station 23+68 - 23+88 24 Mar 81

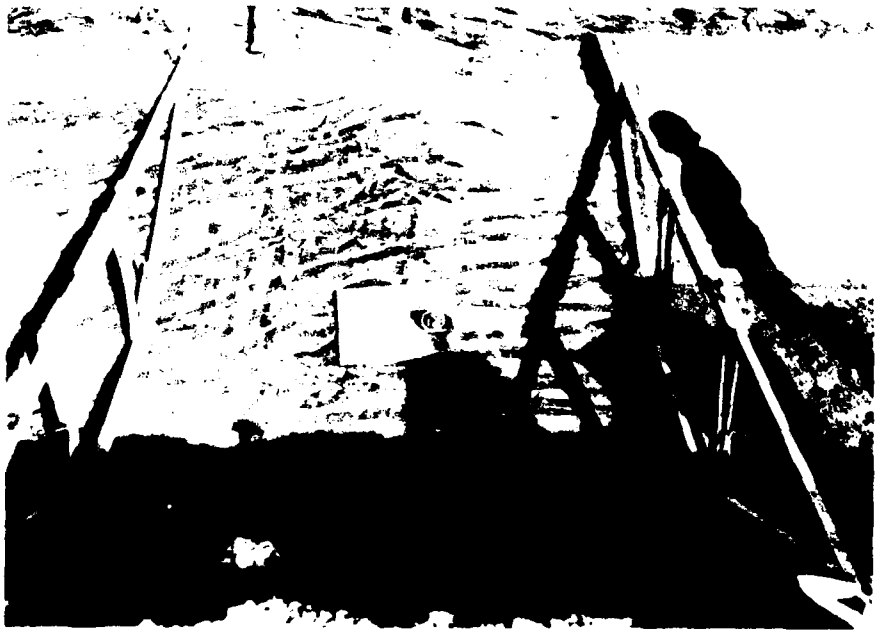


Fig 38 Conduit foundation. Station 23+88 - 24+08 24 Mar 81

Fig 39 Conduit foundation. Station 24+08 - 24+28 1 Apr 81

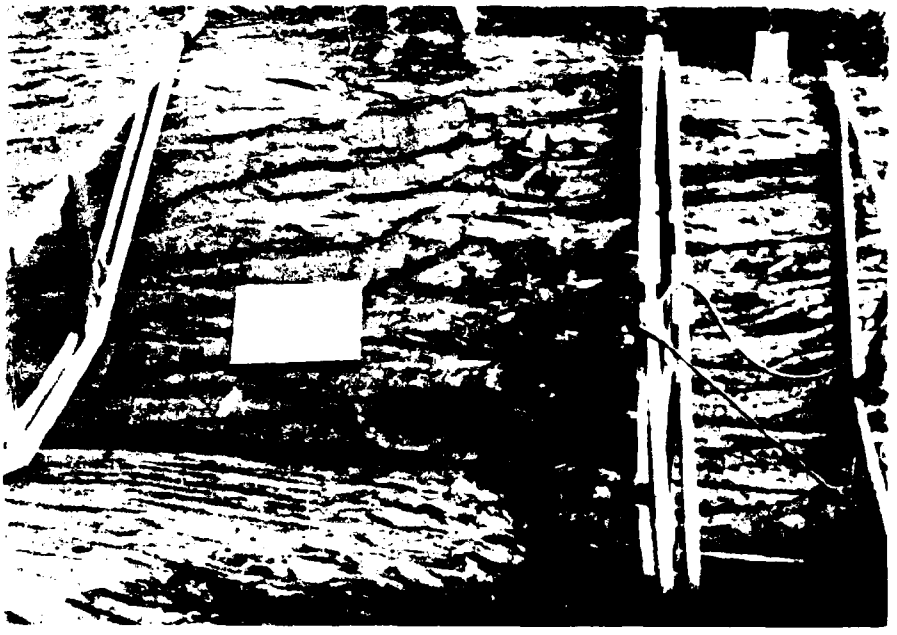


Fig 40 Conduit foundation. Station 24+28 - 24+48 2 Apr 81

Fig 41 Conduit foundation. Station 24+48 - 24+68 3 Apr 81

Fig 42 Conduit foundation. Station 24+68 - 24+88 6 Apr 81

Fig 43 Conduit foundation. Station 24+88 - 25+08 6 Apr 81

Fig 44 Conduit foundation. Station 25+08 - 25+28 7 Apr 81

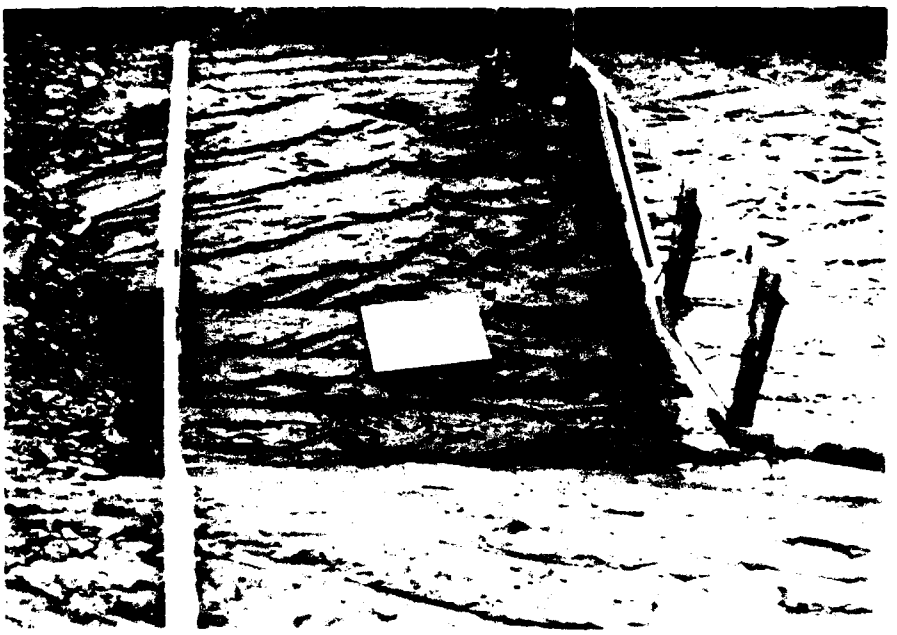


Fig 45 Conduit foundation. Station 25+28 - 25+48 8 Apr 81

Fig 46 Conduit foundation. Station 25+48 - 25+68 8 Apr 81

Fig 47 Conduit foundation. Station 25+68 - 25+88 10 Apr 81

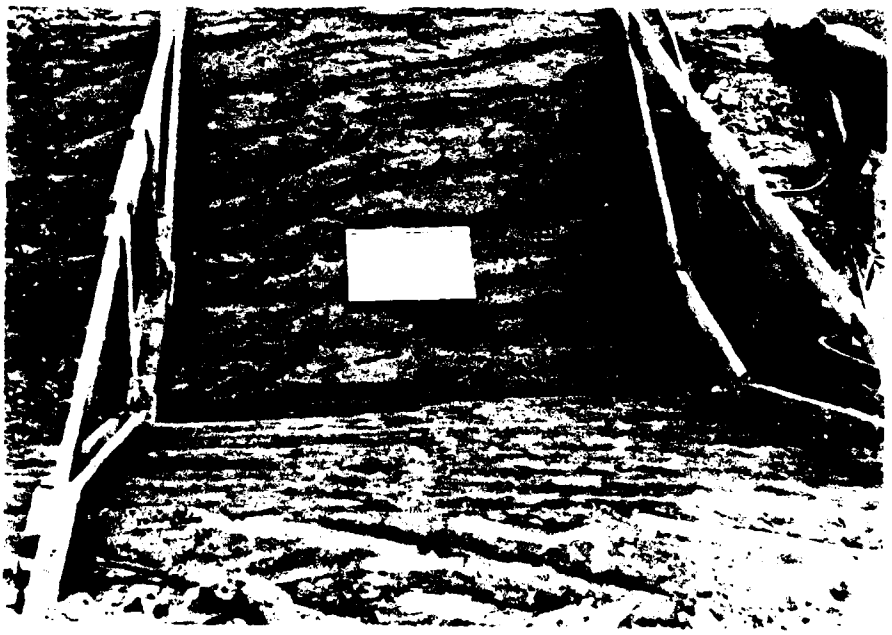


Fig 48 Conduit foundation. Station 25+88 - 26+08 10 Apr 81

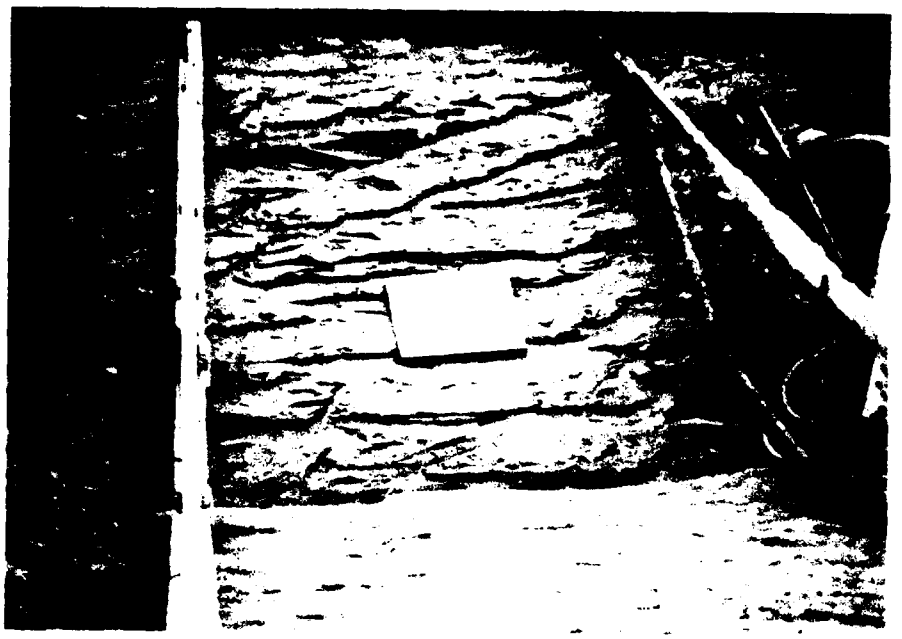


Fig 49 Conduit foundation. Station 26+08 - 26+28 10 Apr 81

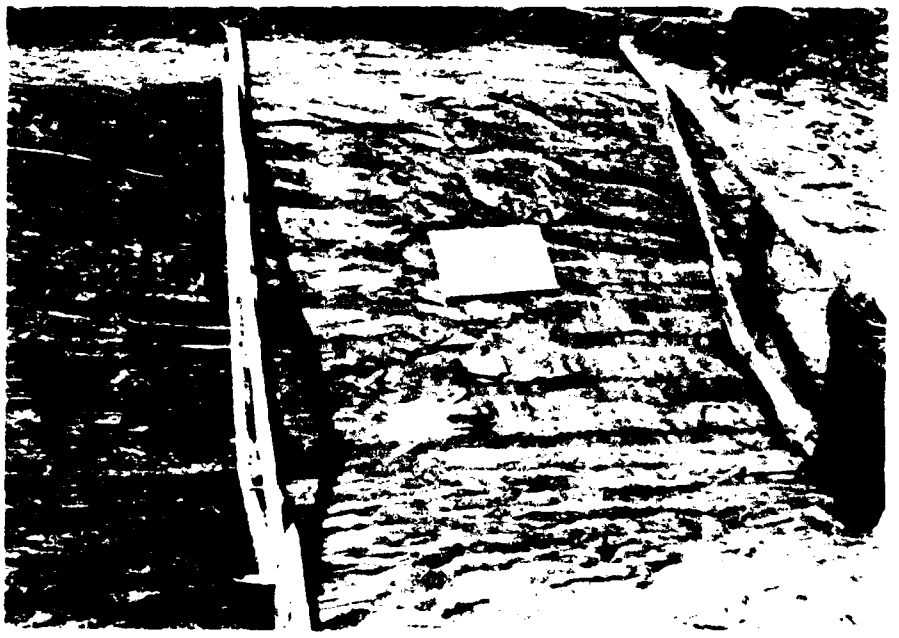


Fig 50 Conduit foundation. Station 26+28 - 26+48 13 Apr 81

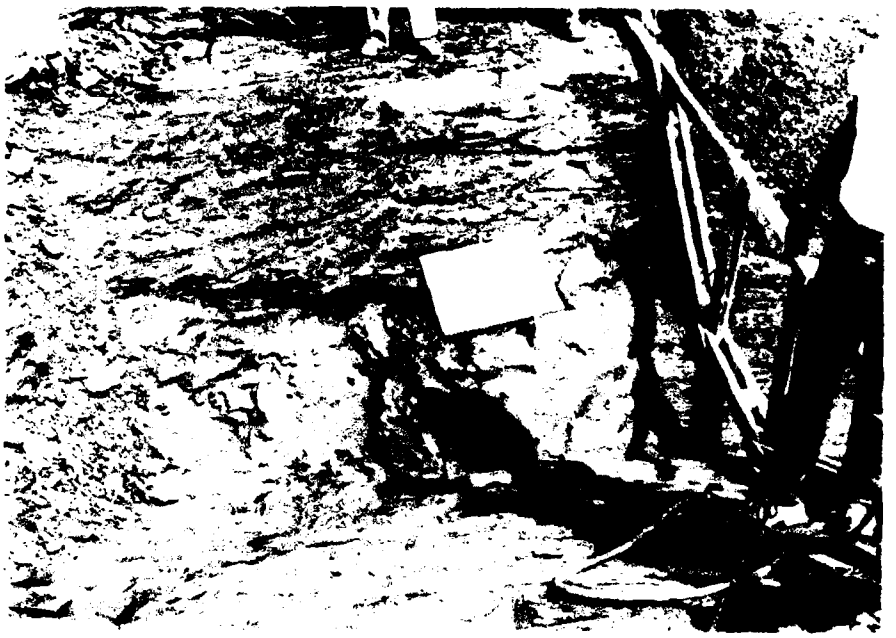


Fig 51 Conduit foundation. Station 26+48 - 26+68 13 Apr 81

Fig 52 Conduit foundation. Station 26+68 - 26+88 16 Apr 81

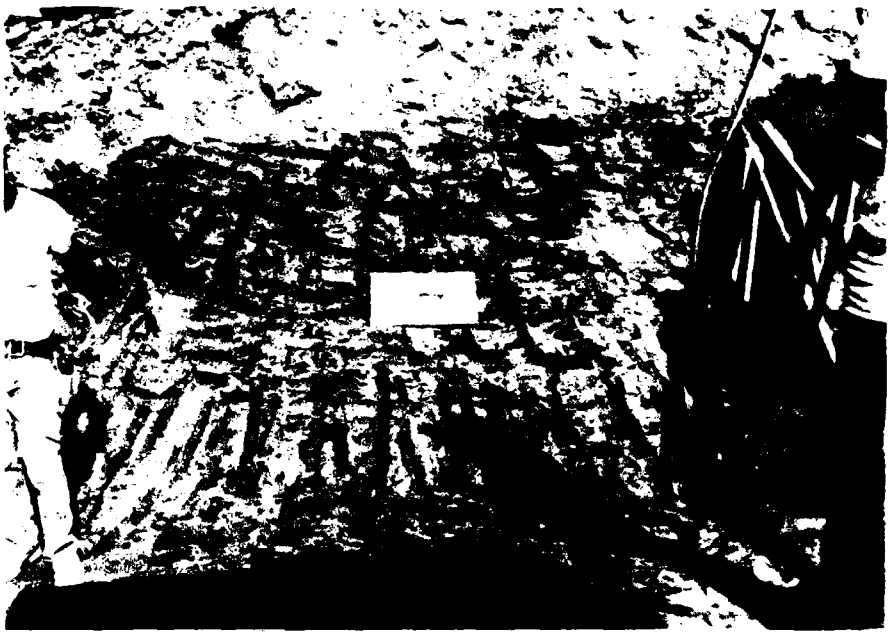


Fig 53 Conduit foundation. Station 26+88 - 27+08 16 Apr 81

Fig 54 Stilling basin chute foundation. Contact between Upper Britton and Lower Britton members in center of photo at station 27+58 25 Feb 81

Fig 55 Stilling basin chute foundation. Station 27+65 25 Feb 81

Fig 56 Stilling basin foundation. Station 27+65 29 Jan 81

Fig 57 Stilling basin foundation. Station 27+80 29 Jan 81

Fig 58 Stilling basin foundation. Station 28+78 31 Jan 81

Fig 59 Stilling basin foundation. Station 27+95 2 Feb 81

Fig 60 Stilling basin foundation. Station 27+90 30 Jan 81

Fig 61 Joint in stilling basin foundation. Station 28+60 30 Jan 81

Fig 62 Stilling basin end key foundation. Station 28+80
Right side 17 Mar 81

Fig 63 Stilling basin end key foundation. Station 28+80
Left side 18 Mar 81

Fig 64 Foundation right of intake tower. Station 18+85 - 19+70 24 Jun 81

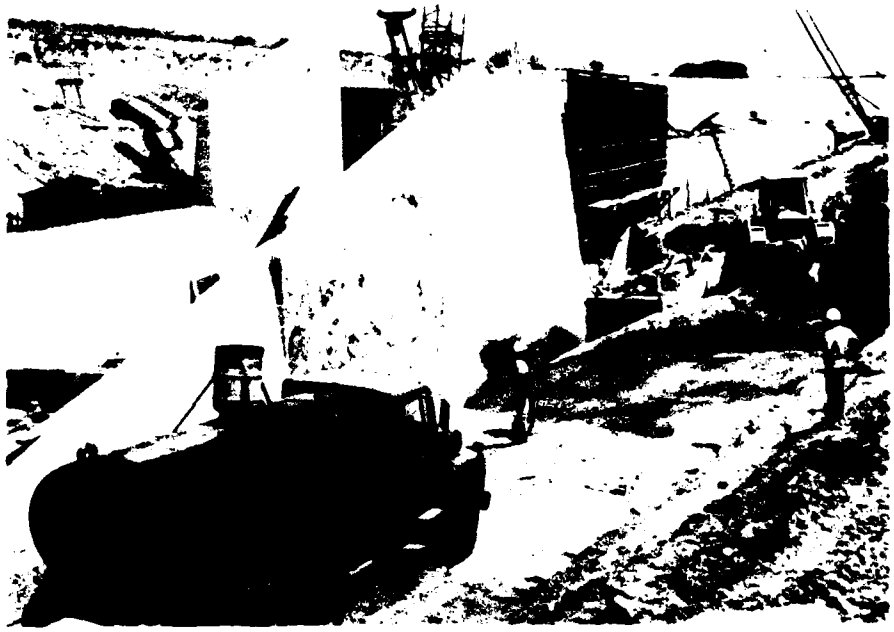


Fig 65 Foundation right of intake tower. Station 18+85 - 19+70 24 Jun 81

Fig 66 Foundation right of conduit. Station 20+75 - 21+75
29 Jun 81

Fig 67 Foundation right of conduit. Station 20+75 - 21+75
29 Jun 81

Fig 68 Foundation left of conduit. Station 20+50 - 21+50
13 Jul 81

Fig 69 Foundation left of conduit. Station 21+50 - 22+50
15 Jul 81

Fig 70 Foundation left of conduit. Station 22+50 - 23+50
17 Jul 81

Fig 71 Foundation right of conduit. Station 23+50 - 24+10
24 Jul 81

Fig 72 Foundation at base of slope - right of conduit.
Station 20+50 - 22+00 28 Jul 81

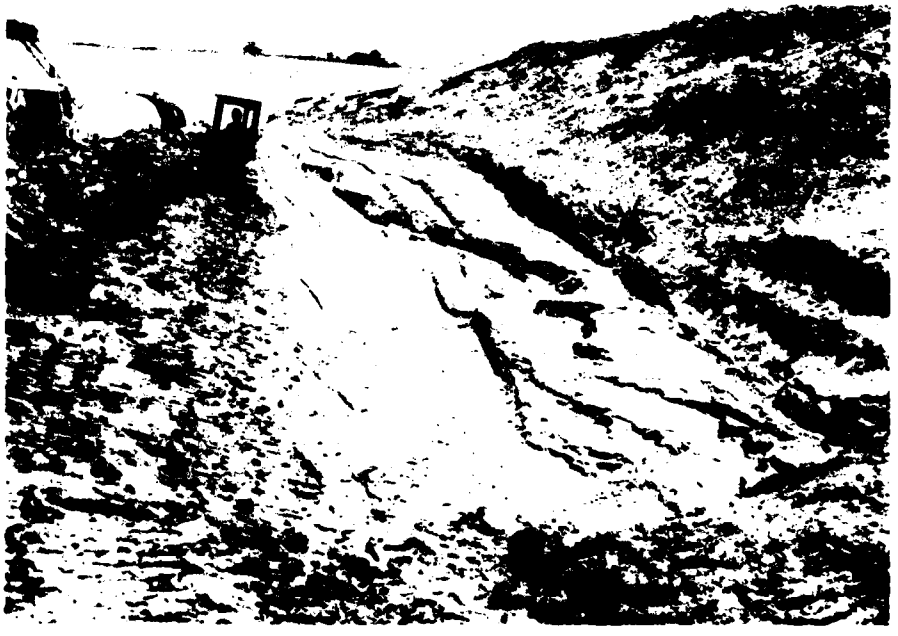


Fig 73 Foundation at base of slope - right of conduit.
Station 22+00 - 24+00 29 Jul 81

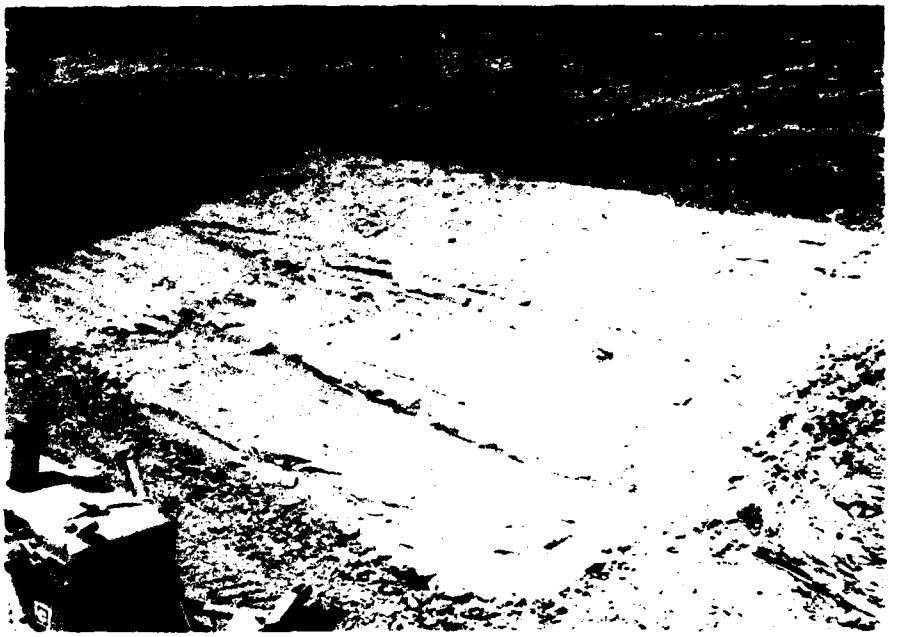


Fig 74 Excavation slope right of conduit. Station 20+50 - 21+70 5 Aug 81

Fig 75 Excavation slope left of intake tower. Station 18+90 - 20+50 6 Aug 81

Fig 76 Excavation slope right of intake tower. Station 18+90 - 20+50 10 Aug 81

Fig 77 Excavation slope left of conduit. Station 20+50 - 21+50 20 Aug 81

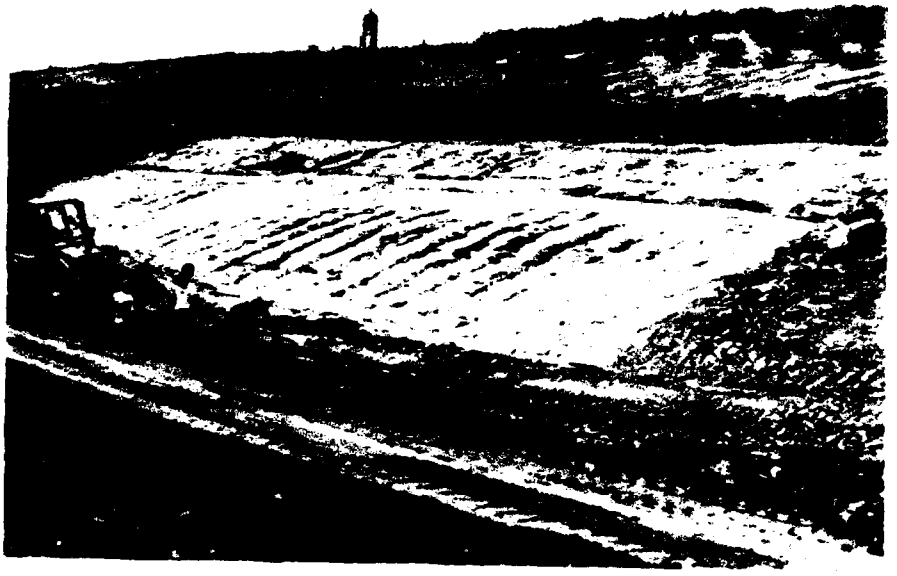


Fig 78 Excavation slope left of conduit. Station 21+60 - 22+50 21 Aug 81

Fig 79 Excavation slope left of conduit. Station 22+50 - 24+00 22 Aug 81

Fig 80 Excavation slope right of conduit. Station 21+80 - 23+10 24 Aug 81

Fig 81 Excavation slope right of conduit. Station 23+10 - 24+00 25 Aug 81

Fig 82 Excavation slope right of conduit. Station 24+00 - 25+20 26 Aug 81

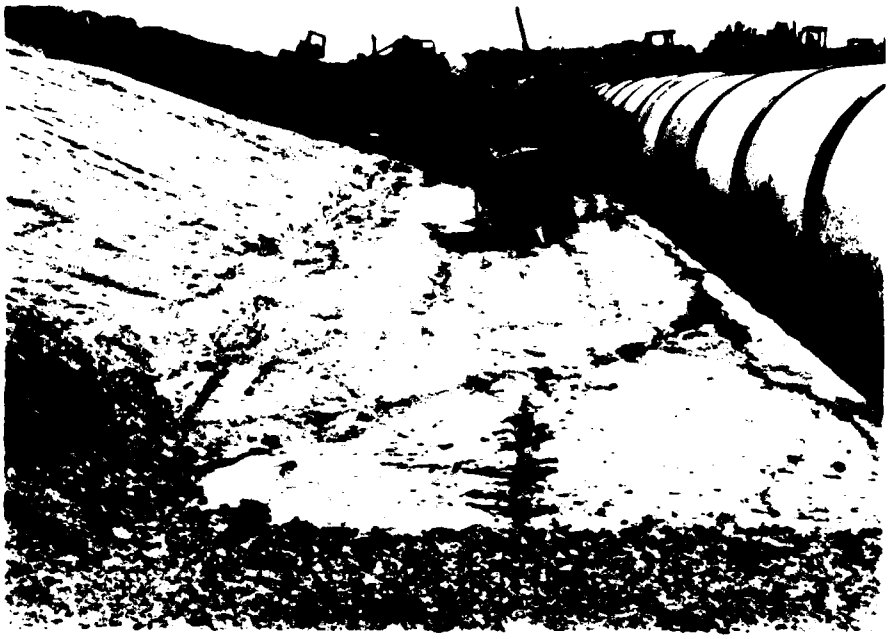


Fig 83 Foundation right of conduit. Station 24+00 - 25+20 26 Aug 81

Fig 84 Excavation slope right of conduit. Station 26+40 - 27+20 10 Sep 81

Fig 85 Foundation right of conduit. Station 26+40 - 27+20 10 Sep 81

Fig 86 Excavation slope right of stilling basin. Station 27+30 - 28+00 11 Sep 81

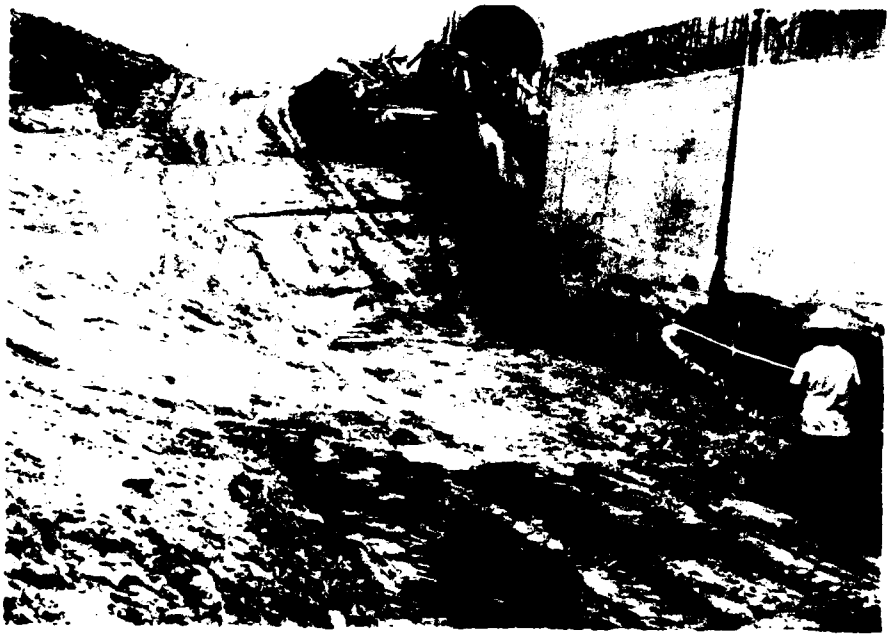


Fig 87 Foundation right of stilling basin. Station 27+30 - 28+00 11 Sep 81

Fig 88 Excavation slope right of stilling basin. Station 28+00 - 28+50 15 Sep 81

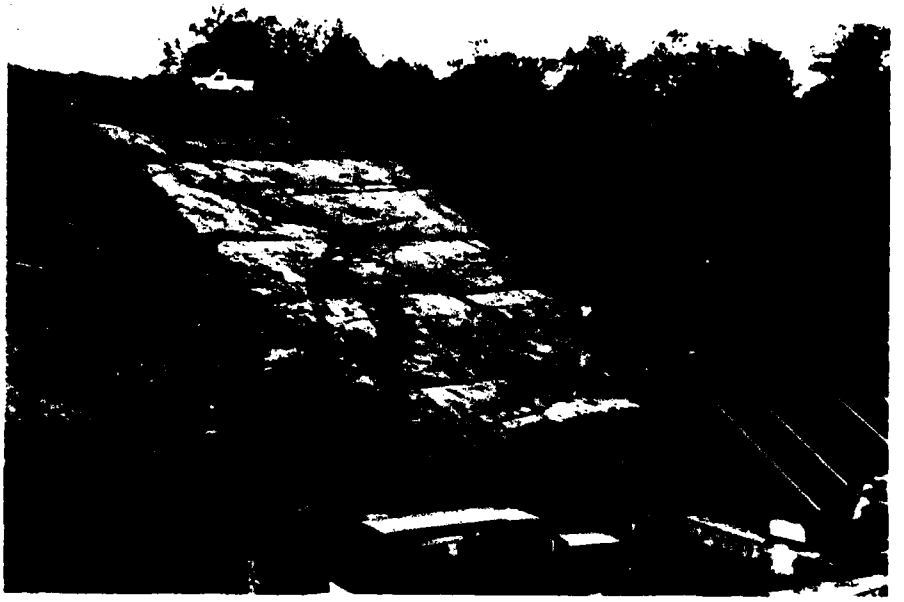


Fig 89 Excavation slope right of stilling basin. Station 28+50 - 29+00 16 Sep 81

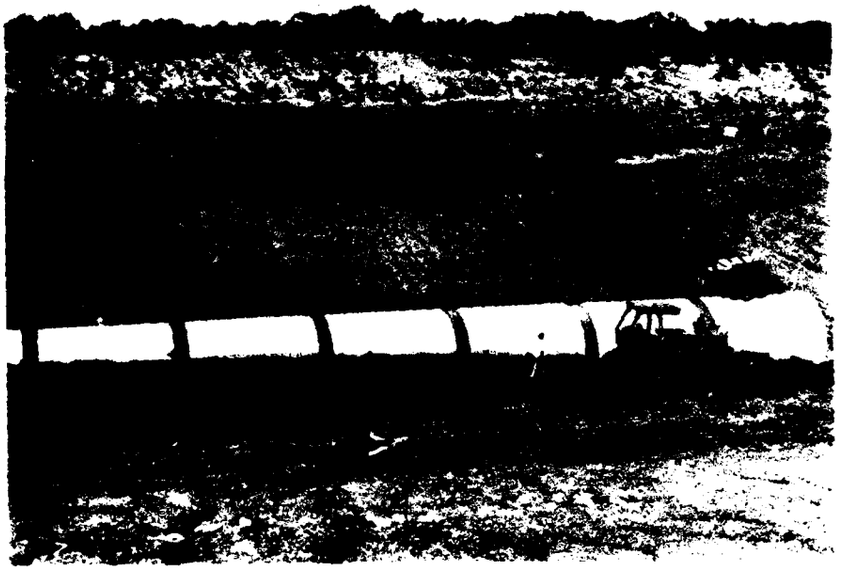


Fig 90 Excavation slope left of conduit. Station 26+30 - 27+20 17 Sep 81

Fig 91 Foundation left of conduit. Station 26+30 - 27+20 17 Sep 81

Fig 92 Excavation slope left of stilling basin. Station 27+20 - 27+80 18 Sep 81

Fig 93 Foundation left of stilling basin chute. Station 27+20 - 27+80 18 Sep 81

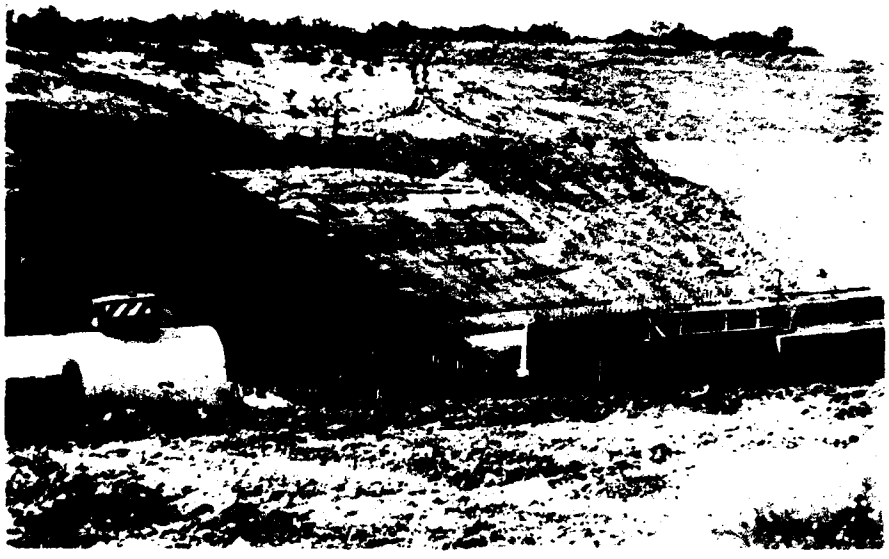


Fig 94 Excavation slope left of stilling basin. Station 27+80 - 28+30

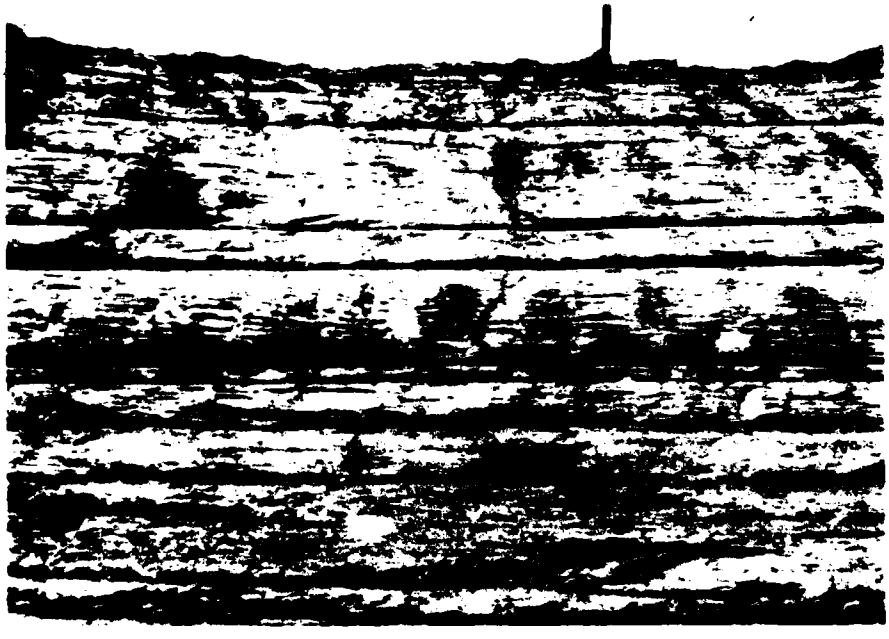


Fig 95 Excavation slope left of stilling basin. Station 27+80 - 28+30 21 Sep 81

Fig 96 Excavation slope left of stilling basin. Station 28+50 - 28+90 22 Sep 81

Fig 97 Excavation slope left of stilling basin. Station 28+50 - 28+90 22 Sep 81